PHILADELPHIA TEXTILE SCHOOL

of the

Pennsylvania Museum of Art

FIFTY-FOURTH YEAR
1937-1938

Broad and Pine Streets
Philadelphia

Technical Education in Textiles

at the

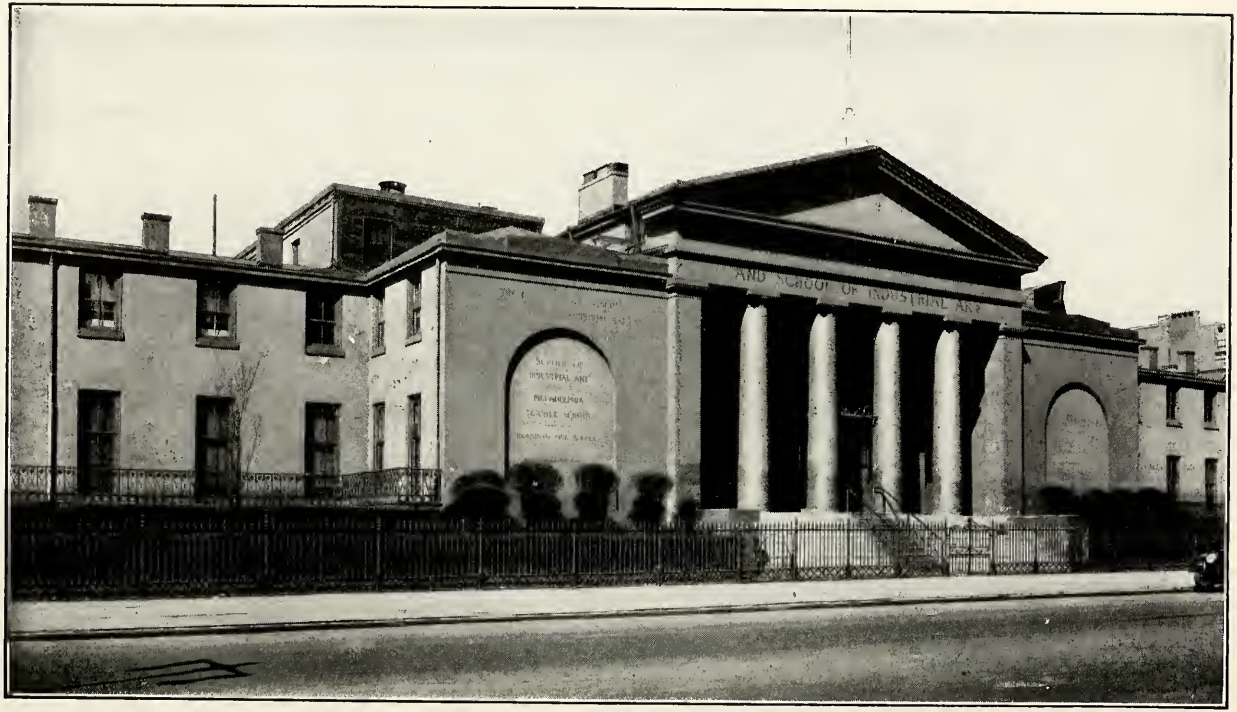
Philadelphia Textile School

of the

Pennsylvania Museum of Art

FIFTY-FOURTH YEAR
1937-38

Broad and Pine Streets
Philadelphia



MAIN ENTRANCE TO THE INSTITUTION

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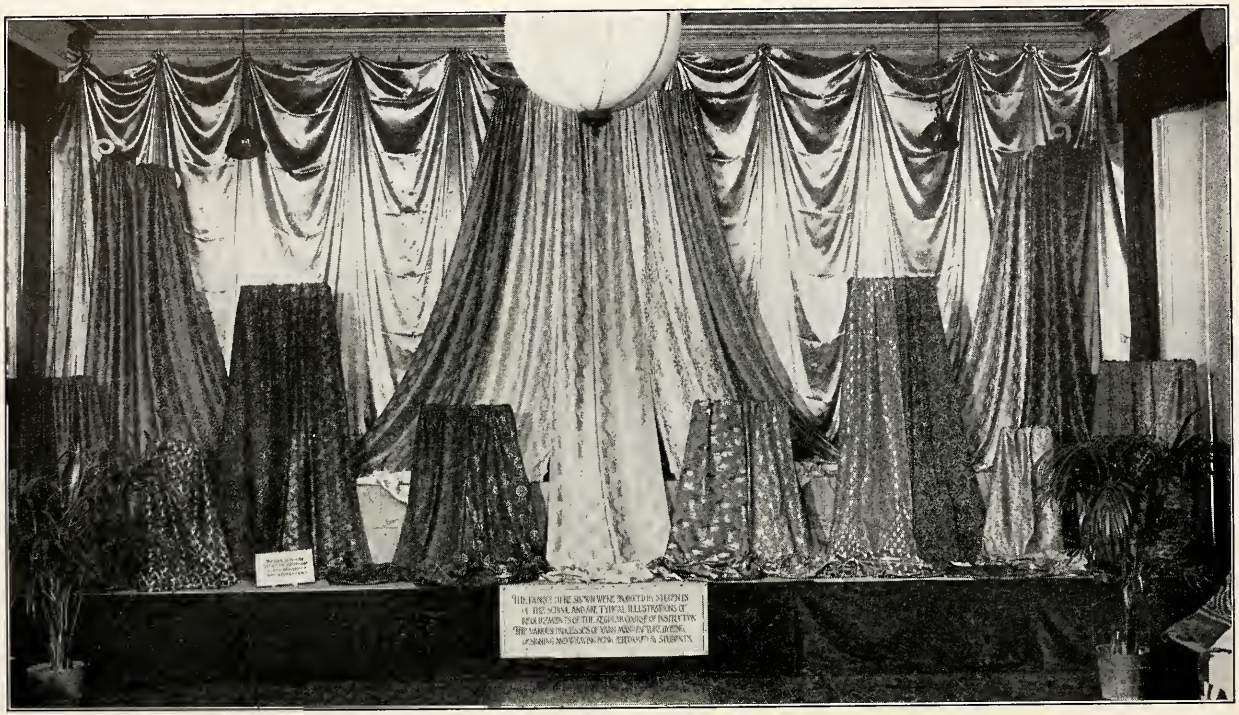

EXHIBITION HALL

Showing special display of Dress Silks, Draperies and Upholstery Fabrics

Foreword

Educators of our higher educational institutions appear to lack appreciation of the extent and importance, as well as the permanence of the textile industry, as such, as a field for suitable young men who possess the advantages that come of a well planned technical education. Perhaps this lack of appreciation accounts for the fact that the field is not suffering from such overcrowding as is so apparent in law, medicine and engineering.

A large portion of the student body of the Philadelphia Textile School is made up of young men who are either related to, or acquaintances of former students who have attained success in after life. This in itself is a fine testimonial to the School's worth, but it is distinctly important that its advantages be presented to many other young men in order that a requisite supply of the School's graduates may be assured.

This abridgment of the Annual Circular is intended to convey a message to prospective students and parents, as well as to the Faculty Advisors and Guidance Counsellors of high schools and colleges. It tells briefly of an attractive field for higher education in which success is not necessarily predicated on previous textile experience.

The following pages give some idea of the School's unique position in the development of technical education, and the steps by which this position has been attained. The educational methods, subjects of study, courses of study, practical mechanical equipment, length of School Year, hours of study, entrance requirements and fees are stated with an aim to brevity and clarity. Some reference is made to the advantages, supplemental but none the less valuable, that present themselves to those pursuing their studies in a city such as Philadelphia, with its vast and diversified industries, textile and otherwise, its museums, and its wholesale and retail establishments of world fame.

Desired additional information may be had by visiting or addressing the Director.

DEPARTMENTAL ADVISERS

The school takes pleasure in announcing that the following gentlemen will act as advisers in matters pertaining to the various branches of the courses of study:

RAW MATERIALS, YARNS

ROBERT C. BOGER, President, Boger & Crawford, Philadelphia.
HOWLAND W. BOTTOMLEY, Firm of Howland Croft, Sons & Co., Camden, N. J.
JOHN FISLER, President, Yewdall & Jones, Philadelphia.
JOS. R. GRUNDY, Firm of Wm. H. Grundy Co., Inc., Bristol, Pa.
THEODORE B. HAYWARD, Philadelphia representative of Swift & Co., Wool.
HENRY LEGGE, Firm of Percy A. Legge, Philadelphia.
E. B. MOORE, President and General Manager of Penn Worsted Co., Philadelphia.
HERBERT E. WEBB, Firm of Chas. J. Webb Sons & Co., Philadelphia.

FABRICS—Cotton, Wool, Worsted and Silk

WILLIAM H. FOLWELL, President of Folwell Brothers & Co., Inc., Philadelphia.
WM. T. GALEY, JR., General Manager, Aberfoyle Mfg. Co., Chester, Pa.
LEWIS A. HIRD, Firm of Samuel Hird & Sons, Inc., New York.
HARRY LONSDALE, Lonsdale Fabrics, Worsteds, Philadelphia.
WALTER ROSSMASSLER, Firm of Sauquoit Silk Mfg. Co., New York, Bethlehem and Scranton.
HERBERT H. SCHELL, President, Sidney Blumenthal & Co., New York.

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STANLEY H. HART, Firm of Hart & Foster Co., Philadelphia.
WILLIAM C. ROBB, Philadelphia Representative of General Dyestuff Corp., New York, N. Y.

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EDWARD JEFFERSON, Firm of Edward Jefferson, Philadelphia, Importer of Worsted Machinery.
OTTO SCHAUM, } Fletcher Works, Philadelphia (formerly Schaum &
O. CARL SCHAUM } Uhlinger).
FRANK P. PHELPS, Vice-President, } Crompton & Knowles Loom Works,
IRVING H. VERRY, Vice-President, } Worcester, Mass.; Providence, R. I., and Philadelphia.

GENERAL

MAJOR G. L. GLOECKNER, United States Marine Corps, Philadelphia.
CAPTAIN HARRY KIRSNER, United States Quartermaster Corps, Jefferson Barracks, St. Louis, Mo.
MAJOR WILLIAM H. MIDDLESWART, United States Quartermaster Corps, Washington, D. C.

CALENDAR—SCHOOL YEAR 1937-1938

SEPTEMBER

Monday, 13th—Registration for First Year Men.
Tuesday, 14th—Registration for Upper Class Men.
Wednesday, 15th—Sessions of Day School begin at 9 A. M.
Wednesday, 29th—Registration of Evening Students for Classes not previously filled.

OCTOBER

Monday, 4th—Sessions of Evening School begin at 7.30 P. M.

NOVEMBER

Tuesday, 9th—Day Classes, First Quarter ends.
Wednesday, 10th—Day Classes, Second Quarter begins.
Thursday, 25th, Friday, 26th, Saturday, 27th } Thanksgiving Holidays, School closed.

DECEMBER

Monday, 20th, through Saturday, January 1st } Christmas Holidays. School closed.

JANUARY

Saturday, 15th—Day Classes, Second Quarter ends.
Monday, 17th—Day Classes, Mid-Year Examinations begin.
Wednesday, 26th—Day Classes, Mid-Year Examinations end.
Thursday, 27th—Day Classes, Third Quarter begins.

FEBRUARY

Tuesday, 22nd—Washington's Birthday. School closed.

MARCH

Wednesday, 23rd—Day Classes, Third Quarter ends.
Thursday, 24th—Day Classes, Fourth Quarter begins.
Friday, 25th—Evening School closes.

APRIL

Thursday, 14th, Friday, 15th, Saturday, 16th, Monday, 18th } Easter Holidays. School closed.

MAY

Tuesday, 17th—Day Classes, Fourth Quarter ends.
Wednesday, 18th—Final Examinations begin.
Friday, 27th—Final Examinations end.
Monday, 30th—Memorial Day.

JUNE

Thursday, 2nd—Annual Commencement Exercises, in morning.
Thursday, 2nd—Annual Exhibition, opening in the evening, and continuing on week days, from 10 A. M. until 5 P. M., closing Friday, 24th.
Friday, 3rd—Annual Alumni Outing.

STAFF OF THE TEXTILE SCHOOL

Director
DR EDWARD W. FRANCE

Assistants
B. C. ALGEO R. S. COX

BRADLEY C. ALGEO *Professor in Charge of*	Weave Formation.—(Ele., Inter. and Adv.)—Standards.—Methods and Formulas of Textile Calculations in common use.—Organization.—Construction.
RICHARD S. COX *Professor in Charge of*	Free Hand Drawing.—Figured Design.—Color Harmony.—Design Coloring.—(Ele., Inter. and Adv. Classes).—Adaptation of Designs to point paper.—Calculation.—Jacquard Mounting.—Card Stamping.—Lacing.—Demonstration and practical production of all forms of Jacquard fabrics as per classes requirements.
ELMER C. BERTOLET *Professor in Charge of*	Chemistry. — Bleaching. — Dyeing and Fabric Printing.—Research Problems of the Chemical and Dyeing industry.—The dyeing of all yarns and fabrics as per schedule requirements.
E. W. FRANCE *Lecturer on*	Factory Management.—Plant equipment required in the Processing of cotton, wool, worsted, synthetic fibres and silk, from the raw materials used to the finished products.—Calculations and methods employed in pre-estimating the losses and shrinkages in the various stages of manufacture.—Cost Accounting, Merchandizing and sales.

A. WARD FRANCE *Instructor in Charge of*	Woolen and Worsted Yarn Mfg. Lab.—Wool Blending for plain and fancy mixtures.—Wool Carding. — Wool Spinning. — Worsted Carding, Drawing, Spinning and Twisting.
WILLIAM C. PFEIFFER *Instructor in Charge of*	Power Loom Weaving Dept.—(Inter. and Adv. Classes.)—Loom Mounting.—Loom timing and adjusting.—Reeding.—Chain building and the weaving of single and multiple ply fabrics as per schedule requirements.
JOHN NAAB *Instructor in Charge of*	Cotton Yarn Manufacturing Lab.—Cotton Carding.—Combing, Drawing, Spinning and Twisting. —Plain Hosiery Knitting.—Plain and Fancy Rayon and Silk Warp Preparation and Weaving.
WM. A. McLAIN *Instructor in Charge of*	Hand Warping and Weaving Lab.—Loom Mounting.—Drawing-in.—Reeding and Weaving, cottons, woolens, worsteds and silks of single-ply construction.

FRANK L. GIESE *Instructor in*	Weave Formation.—(Ele., Inter. and Adv.) Calculations.—Analysis and Fabric Structure.—Organization of and planning of specifications for production of fabrics of cotton, wool, worsted and silk.
ERCAL KAISER *Instructor in*	Color Harmony.—Design Coloring.—Figured Design.—Jacquard Mounting.—Card Stamping and Related Branches.
ROBERT S. CUNNINGHAM *Instructor in*	El. Weave Formation, Calculations; Loom, Mounting, Drawing-in, Weaving; Cotton, Carding, Spinning and Twisting.
HOWARD A. WALTER *Instructor in*	Chemistry.—Industrial and Textile Chemistry.—Quantitative and Technical Analysis.—Textile Fibres and Microscopy of Textile Fibres.
PERCIVAL THEEL *Instructor in*	General Inorganic Chemistry. — Organic Chemistry.—Chemistry of Dyestuffs.—Physical Chemistry. — Spectrophotometry.
GEORGE G. BYLER *Instructor in*	Elementary Chemistry.—Chemical Calculations.—Formulas.—Qualitative Analysis.
JOSEPH E. GOODAVAGE *Instructor in*	Dyeing.—Practical Methods as to Bleaching of Vegetable, Animal and Synthetic Fibres.—Practical Methods employed as to the Dyeing and Color Matching of Colors with various Substantive, Basic, Vat and other dyes as well as Sample Matching and Dyeing.—Printing and Extracting.
RALPH DUNKELBERGER *Instructor in*	Drawing.—Historic Ornament.—Figured Design as applied to Woven Textile Fabrics, Floor-Coverings, and etc.—Draperies.—Rugs.
WM. B. WILLIAMSON *Instructor in*	Wool and Worsted Cloth Finishing.—Wool Grades. — Wool Sorting. — The Properties and Characteristics of Wool.—Calculations on Shrinkages and Market Values of Clean Content.
ARTHUR T. CAMERON, B.S. in Econ., A.M. (C.P.A.) *Lecturer*	Cost Systems, and Accounting in Textile Mills.
HERMAN E. MICHL, B.S. in Econ. *Lecturer*	Economic Problems relating to Textiles and their Distribution.
ALAN G. MARQUART *Assistant in*	Wool Carding.—Wool Yarn Spinning.—Worsted Spinning. — Worsted Drawing. — Worsted Yarn Spinning and Twisting.—Plain and Fancy Mixes.
ERVIN WILMER ROBERT J. REILLY *Assistants in*	Harness and Jacquard Warp Preparation.—Power Weaving and Related Branches.
FULTON M. FARRELL *Instructor in* (Evening)	The Raw Materials of the Wool and Worsted Industry.—Wool Grading.—Wool Sorting.—Properties and Characteristics.—Estimated Losses.

ANNA C. KRECKER, *Secretary*

WILLARD P. GRAHAM, *Registrar*

MAKING AND MARKETING TEXTILES

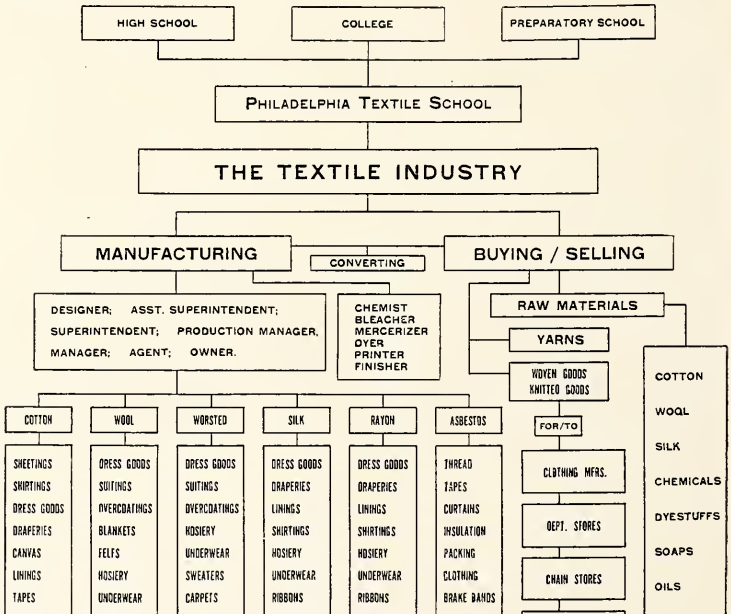
Many recent inquiries throughout the United States have prompted this presentation

The intent is, in a brief and general manner, to give a graphic view of the scope of the textile industry, and of the variety of opportunities it affords to capable young men whose inclinations may be artistic, mechanical, or commercial.

The Philadelphia Association of Manufacturers of Textile Fabrics, realizing the Industry's need of technically trained men, in 1884 organized and financed the Philadelphia Textile School, which subsequently became one of the schools of the Pennsylvania Museum and School of Industrial Art, retaining its original name.

The Philadelphia Textile School is an internationally recognized technical school, and should not be confused with those which, in the restricted meaning of the term, are known as vocational schools.

The textile industry—second in importance only to that of foodstuffs—is, in company with practically all other large industries, passing through a period of reconstruction and reorganization. One of the results, is a demand for young men of a high type, technically trained.



EDUCATION IN THE ARTS AND CRAFTS OF TEXTILES

Systematic effort along the line of technical education in textiles, although of comparatively recent origin, has already made itself felt to a surprising degree, and the success of graduates in textiles has been so gratifying that it has long since ceased to be looked upon as an experiment. Many men who have secured a college training do not feel inclined to the so-called learned professions, and, deeming architecture, engineering and similar lines overcrowded, are awakening to the enormous opportunities open to those who can bring well-trained minds to the consideration of textile problems. On the other hand, the man who has been brought up to some form of textile industry, be he old or young, finds that the old rule-of-thumb methods no longer suffice, and turns to the school, feeling that it alone can supply to the ambitious and energetic workman, not only the reasons for the old forms, but the newer and better methods and the more lucrative branches which progress in the industry has developed. He not only recognizes the fact that the textile school is a source of such information as is required, whence it may be obtained from men thoroughly capable of teaching, but he is also aware that an amount of knowledge can be secured in a course of study at the school which could not be exceeded by many years of plodding in various mills.

In the mind of the person contemplating entering the field of textiles with the idea of making it his life's work, there naturally arises a query as to the importance of the industry and the opportunities it offers in the way of remunerative employment for determined, energetic effort. The question as to the importance of textiles is easily answered, if one will but consider for a moment the variety and quantity of the products used by the average individual, the millions of persons populating the globe, and the fact that the consumption of textiles is a necessity, and is destined to so continue as long as human kind lasts.

A glance at a comparatively recent report of the United States Census shows the following, with reference to all classes of textiles:

Number of establishments.....	19,266
Wage earners (average for the year)	1,474,325
Wages	$1,017,301,000
Cost of materials, containers, fuel and purchased electric energy....	$2,459,835,000

Value of products $4,811,238,000
Value added by manufacture.....$2,351,403,000

It is quite evident that an operation of such a magnitude cannot be conducted without the employment of a vast army of skilled workers, whose efforts must be guided and controlled by a corps of officers, as it were, each in turn striving to do his part and qualify for advancement. One does not have to investigate the expensive silks and intricate tapestries to form an idea of the degree of skill required by those who produce these hundreds of millions of dollars in products. The simplest muslin, with the innumerable small fibres of which it is composed, its fineness and beautiful purity, all testify to wonderful achievement along the lines of mechanical invention and the manipulation of material.

The breadth of the courses of study offered by the Philadelphia Textile School equips the graduate to choose not alone along the manufacturing branch but the commercial as well, each of which is divided into sections as to buying and selling and the various departments of production. They, in turn, again divide with reference to the raw materials, viz.: cotton, silk, wool, worsted, linen, etc.

THE PHILADELPHIA TEXTILE SCHOOL

Founded in 1884, was the pioneer in this field, and for thirteen years following, the sole exponent of technical education in textiles in America. It demonstrated to the world the feasibility of the idea of combining, in a school, both theoretical and practical instruction in the processes from the raw material to the finished goods; and the result has been an important factor in giving the Philadelphia Textile School a leading position in the ranks of similar institutions of learning. In fact, its success has been so marked as to lead so good a judge as the late Mr. W. E. B. Priestley, chairman of the Committee of Technical Instruction of the Municipal Technical College, Bradford, England, to say: *"For practical work in weaving, designing and the teaching of the manipulation of textiles generally, the Philadelphia Textile School is ahead of similar European institutions."*

The mechanical equipment has been selected so as to afford facilities for a study of the basic facts, and includes typical machinery for producing cotton, wool, and worsted

yarns; warping; card stamping; finishing; knitting; scouring; bleaching; dyeing; printing. The chemistry and dyeing laboratories are adequately supplied with needed apparatus; and the field of microscopy is well provided for. All of these play a part in making it possible for the student to bring out a large variety of experimental fabrics of commercial utility and value.

From the raw materials onward, the student designs and executes under the guidance of experts. He is taught not only how to calculate a result, but also to perform the actual operations of its production. This product is a type of what is found in the stock of the business houses of the day, and gives the student a knowledge possessed by few who are brought up to mill life exclusively, and a knowledge comparatively unknown to the many engaged in marketing the goods. He is not only instructed in what materials to use and how to put them together satisfactorily, but also, and particularly at this time, when figured and artistically colored effects are the vogue, the art side is emphasized, as the School is one of the schools of the Pennsylvania Museum of Art, and lives in the art atmosphere. He is also instructed how to detect imperfections, to remove impurities and to remedy unexpected defects. His studies include a chemical as well as a physical investigation of the various raw materials, for in these days of close competition, and resulting small percentages of profit, every property of the material in hand must be understood. Waste must be reduced to a minimum, and then utilized; hence the importance attached to a knowledge of the nature of material, a knowledge of which chemistry helps to supply. Without such knowledge the best results are not always obtainable.

THE STAFF OF INSTRUCTORS

Is the result of the school's gradual growth, and has been formed only by the most careful selection of men of acknowledged ability in their respective lines. They are proficient not only in both the practical and theoretical side of the work, but they are skilled in methods of imparting their knowledge in a systematic, consecutive manner. One of the many difficulties encountered by the person who undertakes to study textiles in the mill is the inability of the overseers and operatives to tell him what they know, although they may be perfectly willing to do so. This is but one of the many obstacles that the school overcomes, and, by so doing, helps

SILK FABRIC IN FOUR COLORS AFTER FRENCH MOTIF, PRODUCED BY MEMBERS OF ADVANCED CLASS

to make its graduates successful as manufacturers, merchants, or merchandise distributors.

The instructors being recognized experts, their services as such, quite frequently are sought in the settlement of technical controversies in the commercial world, and this keeps them informed on the newest processes and productions, and in touch with actual conditions.

WORK OF GRADUATES

The young man who is considering the choice of a school wherein to fit himself for his life's work should not only take into consideration the fact that the Philadelphia Textile School holds the leading position because of the practical character of the instruction imparted by its expert teaching staff, with the assistance of the suitable mechanical equipment, but he should endeavor to acquaint himself with the importance of the work which the school's graduates are doing in the industry.

A partial list of the former students of the school, naming the positions they are filling, may be obtained free of charge by personal or written application to Director E. W. France, Broad and Pine Streets, Philadelphia, Pa.

The school does not offer any inducements in the way of promising to find positions for its graduates, but the fact remains that in recent years it has become such a recognized center that the demands the trade makes upon it, for suitable young men are more or less constant.

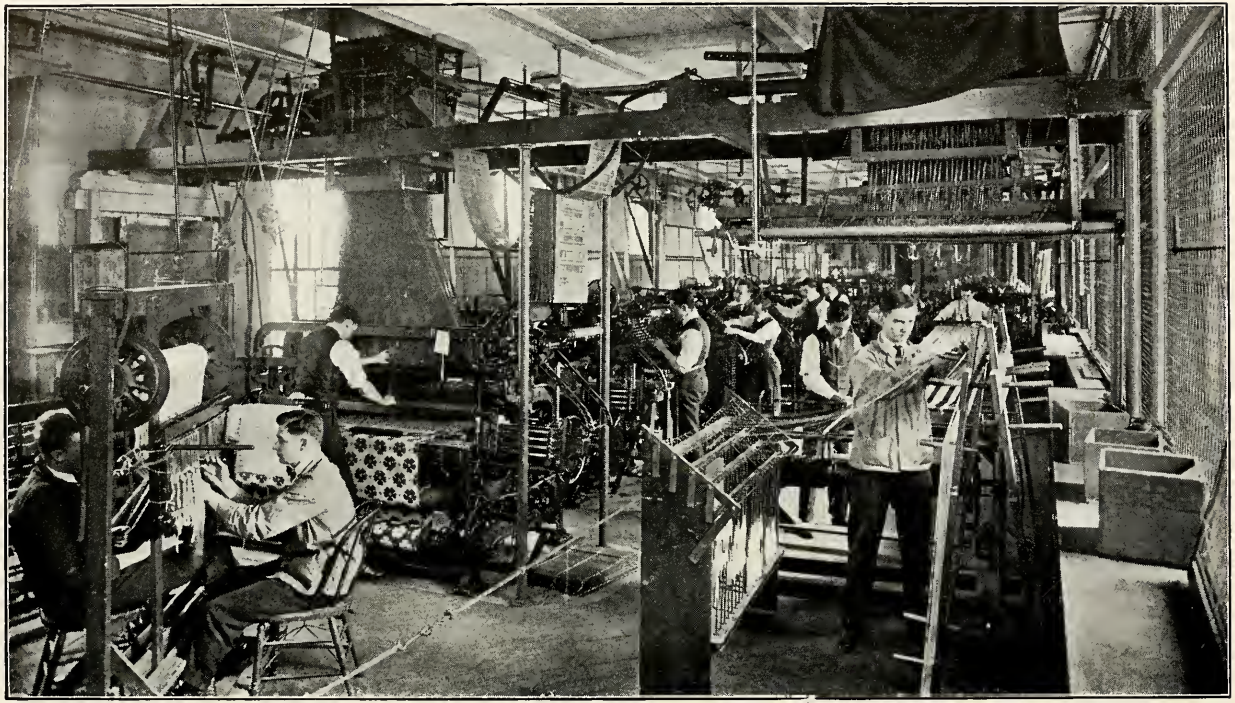
PHILADELPHIA AS AN IDEAL LOCATION

One of the many advantages enjoyed by the Philadelphia Textile School is its unsurpassed location. Situated in the center of a city whose textile industries are diversified to an extent not to be found elsewhere, a man may learn much by observation alone. Philadelphia is neither a cotton city, a wool city, nor a silk city, but handles all these fibres in great quantities, and in almost all the various methods of manufacture.

The Pennsylvania Secretary of Internal Affairs gives the following:

The State of Pennsylvania contains textile establishments with an invested capital of $387,771,900.

The textile and allied industries of the City of Philadelphia, according to figures compiled by the Bureau of



VIEW IN MAIN POWER WEAVE ROOM

Statistics in the Department of Internal Affairs of the state, approximate upwards of $257,896,600. The following gives some idea of the magnitude of production:

Wool and worsted yarns	$10,994,400
Carpets and Rugs	10,946,300
Cotton Goods, including yarns and threads	9,668,000
Hosiery	39,116,100
Wool, worsted and felt goods	12,442,300
Silk goods, including rayon	1,791,900
Silk yarns and thread, including rayon	3,060,000
Dyeing and finishing textiles	11,437,400
Braids, tapes and bindings	5,182,000
Miscellaneous knit goods	12,446,800

Philadelphia contains 415 spinning, weaving and knitting establishments; upward of 78 independent dyeing and finishing works; 130 raw wool dealers; 150 dealers in cotton, wool and worsted yarns; 33 chemical and dyestuff firms; as well as allied interests which contribute to its enormous production, embracing makers of machinery for spinning, weaving, knitting, dyeing, finishing, power transmission and mill supplies.

There are 74 prominent men's wear and dress goods commission houses and selling agencies in the city; 106 jobbers in woolen, cotton and silk piece goods; 159 wholesale clothing and 250 women's suit and clothing manufacturers.

All of these, together with the large department stores, are, in themselves, educating factors of no mean importance. The opportunity of making a daily inspection of the ever-changing displays of these foremost retail establishments is of great value to the student, and is only one of the many advantages which a few years' residence in such a city is certain to possess for the ambitious student, apart from any immediate reference to the work of the school Public lectures and museums are to him so many added appliances for education. Vast municipal and private undertakings, projected and carried through to successful completion, are examples of skill, thrift and energy of which he had never even dreamed.

Courses of Study—Day School

The School offers two three-year Diploma Courses:

Regular Textile Course,
Chemistry, Dyeing and Printing Course

each planned with a view to providing broad grounding in their respective fields, and to cultivating versatility, adaptability, and creative taste. Style changes demonstrate that the novelty in one line of textiles may have had its inception in some line of an entirely different character.

Men who are not in a position to avail themselves of the opportunities of the Diploma Courses are offered their choice of two two-year Certificate Courses, as follows:

Silk Course.
Figured Design Course.

REGULAR TEXTILE COURSE (Diploma)

Experience through the years has developed this course to such an extent as to afford the best opportunity for the student to acquire the necessary breadth and thoroughness. Trends in industry continually add emphasis to the importance of familiarity with all the basic materials and pro-

cesses of manufacture, and increase the worth of the well-grounded graduate in whatever field he may engage. The course requires three years for its completion, and includes a study of cotton, wool, worsted, silk and rayon yarns and fabrics.

A general description of the subjects of study covered is briefly, but clearly, explained under their respective heads on pages 37 to 45, inclusive.

The first year requirements for the completion of this course are naturally to be considered as being more or less elementary in character and progressively advanced to the peak in the third or last year of the course.

The wide range of basic, as well as the more intricate fabrics, that are embraced under the broad term of textiles, and in particular as regards their construction, necessitates a wide range of miscellaneous lectures, as the course progresses. Not alone as regards the technical requirements, manufacture, etc., but style trends, material, manufacturing and distributing costs; in other words, the economics of the many phases of the subject must be considered.

FIRST YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Free Hand Drawing and Principles of Figured Design.—Jacquard Design.—Warp Preparation and Weaving.—Cotton Yarn Manufacture.—Chemistry.

SECOND YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Figured Design and Textile Coloring.—Wool and Worsted Yarn Manufacture.—Warp Preparation and Weaving.—Chemistry.—Dyeing.—Wool and Worsted Cloth Finishing.—Miscellaneous Lectures.

THIRD YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Figured Design and Coloring.—Yarn Manufacture; Cotton, Wool and Worsted.—Warp Preparation and Weaving.—Chemistry (advanced).—Dyeing.—Cotton, Wool and Worsted Cloth Finishing.—Miscellaneous Lectures.

CHEMISTRY, DYEING AND PRINTING COURSE (Diploma)

This course requires three years for its completion, and is planned with a view to giving a practical and scientific education to those who desire to embrace in their profession these branches of industrial technology.

A knowledge of the chemistry of raw materials, soaps, oils and dyestuffs, is acknowledged to be of the utmost value in the attainment of the best results with a minimum of damage to the material handled. Dyeing, one of the practical applications of chemistry to industry, reaches its peak of

success as the result of chemical knowledge scientifically applied. The subjects of study include:

FIRST YEAR—First Term

Chemistry I.—General Inorganic.
Chemistry VI.—Chemical Calculations.
Dyeing I.—Physical and Chemical Properties of the Textile Fibres
Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.

FIRST YEAR—Second Term

Chemistry II.—Qualitative Analysis.
Chemistry VI.—Chemical Calculations.
Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.
Dyeing IV.—Principles of Shade Compounding and Matching.

SECOND YEAR—First Term

Chemistry IIIa.—Quantitative Analysis; Gravimetric.
Chemistry IVa.—Organic Chemistry; Aliphatic Series.
Chemistry IXa.—Textile Chemistry; Analysis of Fibres, Yarns and Fabrics.
Dyeing Va.—Color Mixing and Spectroscopy.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

SECOND YEAR—Second Term

Chemistry IIIb.—Quantitative Analysis; Volumetric.
Chemistry IVb.—Organic Chemistry; Aromatic Series.
Chemistry V.—Industrial Chemistry.
Chemistry IXb.—Textile Chemistry.
Dyeing Vb.—Practical Color Matching and Its Problems.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

THIRD YEAR—First Term

Chemistry V.—Industrial Chemistry.
Chemistry VII.—Technical Analysis.
Chemistry VIII.—Chemistry of Dyestuffs.
Chemistry IXc.—Textile Chemistry.
Dyeing VII.—Textile Printing.
Dyeing VIII.—Principles of Dyeing; Advanced Course.
Dyeing IX.—Finishing.

THIRD YEAR—Second Term

Chemistry V.—Industrial Chemistry.
Chemistry VII.—Technical Analysis.
Chemistry VIII.—Chemistry of Dyestuffs.
Chemistry IXd.—Textile Chemistry.
Dyeing VII.—Textile Printing.
Dyeing VIII.—Principles of Dyeing; Advanced Course.
Dyeing IX.—Finishing.

CERTIFICATE COURSES—Two Years

These courses, necessarily abridged and narrowed in their scope, are arranged to provide for those students who, for whatever reason, are not in a position to avail themselves

of the opportunities afforded in the Regular Course. The courses and subjects of study are:

SILK AND RAYON COURSE

FIRST YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Free Hand Drawing and Principles of Figured Design.—Jacquard Design.—Color Harmony.—Warp Preparation and Weaving.—Cotton Yarn Manufacture.—Chemistry.

SECOND YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Figured Design and Textile Coloring.—Warp Preparation and Weaving.—Chemistry.—Dyeing.

FIGURED DESIGN COURSE

FIRST YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Free Hand Drawing and Principles of Figured Design.—Color Harmony.—Jacquard Design.—Warp Preparation and Weaving.

SECOND YEAR

Weave Formation.—Analysis and Structure of Fabrics.—Figured Design and Textile Coloring.—Warp Preparation and Weaving.

ENTRANCE REQUIREMENTS—DAY SCHOOL

The minimum age for admission to all courses is eighteen years.

DIPLOMA COURSES—Three Years

Candidates for admission to the Diploma Courses may present a certificate of graduation from an accredited high school having a four-year course of study, which includes the 8 units listed below; or from a recognized academy of equal rank; or they may offer certification of fourteen college entrance units as defined by the National Conference Committee on Standards of Colleges and Secondary Schools. The unit represents approximately 120 sixty-minute hours devoted, in one school year, to lectures and class work in a subject which requires preparation out of class. Unprepared work, such as drawing, manual training and laboratory work, counts for half as much as subjects requiring preparation.

The fourteen units should include the following studies with the units set opposite them:

Algebra	1	Geometry	1
English	3	History	2
		General Science or Physics	1

the balance being made up of any regular high-school subjects.

A maximum of two entrance conditions is allowed, with the understanding that they shall be removed by the student before beginning his second year.

Each man presents a certified record of scholastic work from his high or preparatory school, upon which his admission depends. Since the large majority of high and preparatory schools throughout the United States are now listed under the Accredited List whose requirements for subjects is approved by the National Conference Committee on Standards of Colleges and Secondary Schools, we require no entrance examinations.

Proficiency in the subject of arithmetic, including fractions, decimals, percentage, proportion and square root is essential, as they are employed in all forms of textile calculations. The attention of candidates from colleges and universities is especially directed to this fact, and a thorough review of arithmetic is urged.

Class work starts promptly on the day scheduled. The studies are such that much is lost by the student who is not present at the opening sessions.

Delay in gaining admission to the classes may be avoided by filing applications well in advance of the opening day, so as to afford sufficient time for the securing of certification of credentials.

CERTIFICATE COURSES—Two Years

Applicants for admission to the Certificate Courses should possess the qualifications as prescribed for admission to the Diploma Courses. If they are deficient in the stated number of college entrance credits, they may present evidence of practical experience (either manufacturing or mercantile), which may be accepted as a substitute for deficiencies in academic preparation, if in the judgment of the Committee on Entrance the practical experience is such as to permit the applicant to attain satisfactory results in the course of study in question. Each case of this kind is given individual consideration.

APPLICATIONS FOR ADMISSION—Day School

Application blanks may be obtained upon request, and should be filled out and returned at least two weeks prior to the beginning of the school year, to allow sufficient time for the certification of entrance credits.

Blank certificates for previous school records are furnished with the application blanks, and should be filled out by the Principal of such school and mailed by him to the Director of the Philadelphia Textile School.

To comply with the Pennsylvania State health laws, a certificate of vaccination must accompany each application.

(Application for admission to Evening School, see page 51.)

TUITION AND OTHER FEES—Day School

For Evening School Fees, see page 51

The tuition and other necessary fees for Diploma and Certificate Courses, with the exception of the course in Chemistry, Dyeing and Printing, aggregate per year the sum of $315, divided as follows:

Tuition (see Note below)	*$285
Deposit (see page 27)	20
Locker Rental (see page 27)	2
Athletic and Club Dues (see page 35)	8
Total charge	$315

*An Incidental Fee of $15 was formerly required from all students whose course included carding, spinning, weaving, chemistry, dyeing, printing or knitting. This Fee has now been merged in the Tuition Fee.

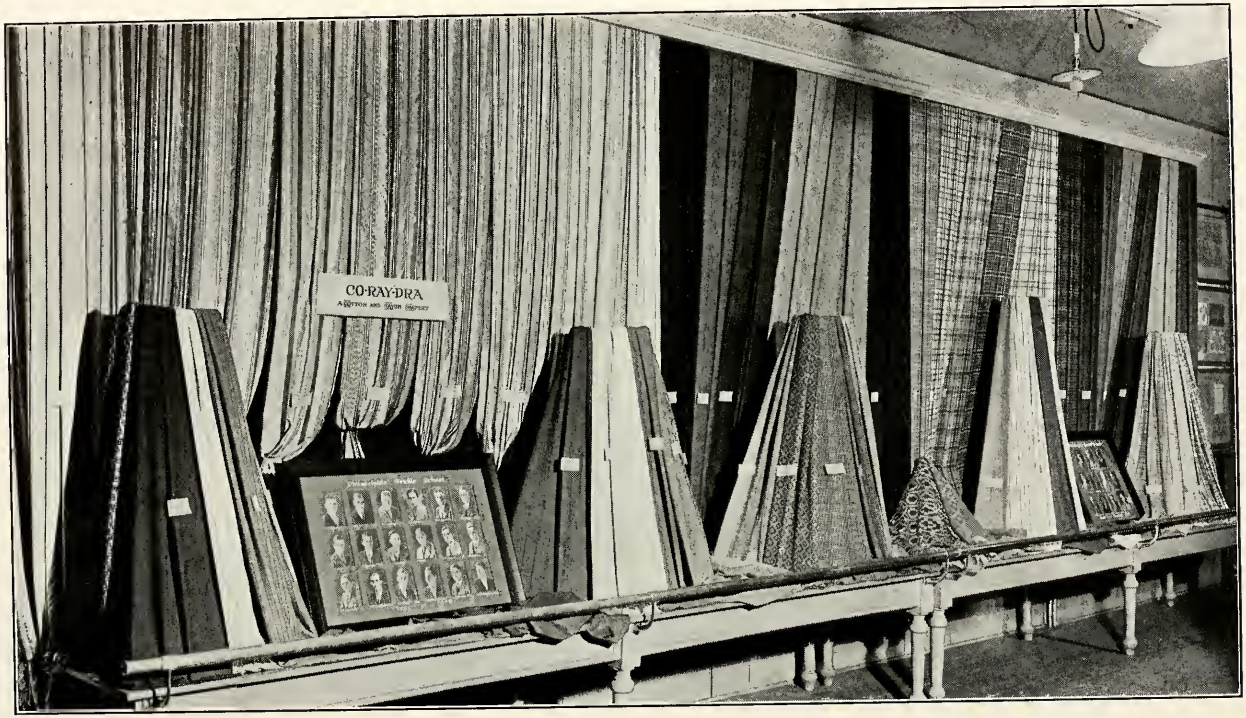
The deposit (see page 27) for the Chemistry, Dyeing and Printing Course is $35, making the total fees for this course $330.

In addition to the fees above, a matriculation fee of $5, payable at time of entrance, is charged all new students.

Note.—Tuition fee for students from foreign countries is $385.

PAYMENTS

About three-fifths of the tuition fee, together with the charge for Locker Rental, Club Dues and Deposit Fee, making a charge of $215.00, *is payable in advance.* The balance ($100.00) is payable on or before February 1st of each year.



SECTIONAL VIEW IN MAIN EXHIBITION HALL, SHOWING VARIOUS TYPES OF FABRIC PRODUCED BY ADVANCED CLASSES

Students failing to make this latter payment at the specified time will be excused from class until payments can be made. *No bills will be sent.* Students' tickets are issued by the registrar on the payment of fees, and students will not be admitted to any class until fees have been paid and the proper ticket obtained.

NOTE—If a student withdraws from the School within one week from the beginning of a semester, the tuition fee and laboratory fees, less the matriculation fee of $5, will be returned. If the student withdraws within one month from the beginning of the semester, three-fifths of the fees will be returned. Refunds will not be considered after the first month of each semester. The matriculation fee is never returned.

DEPOSITS—Day School

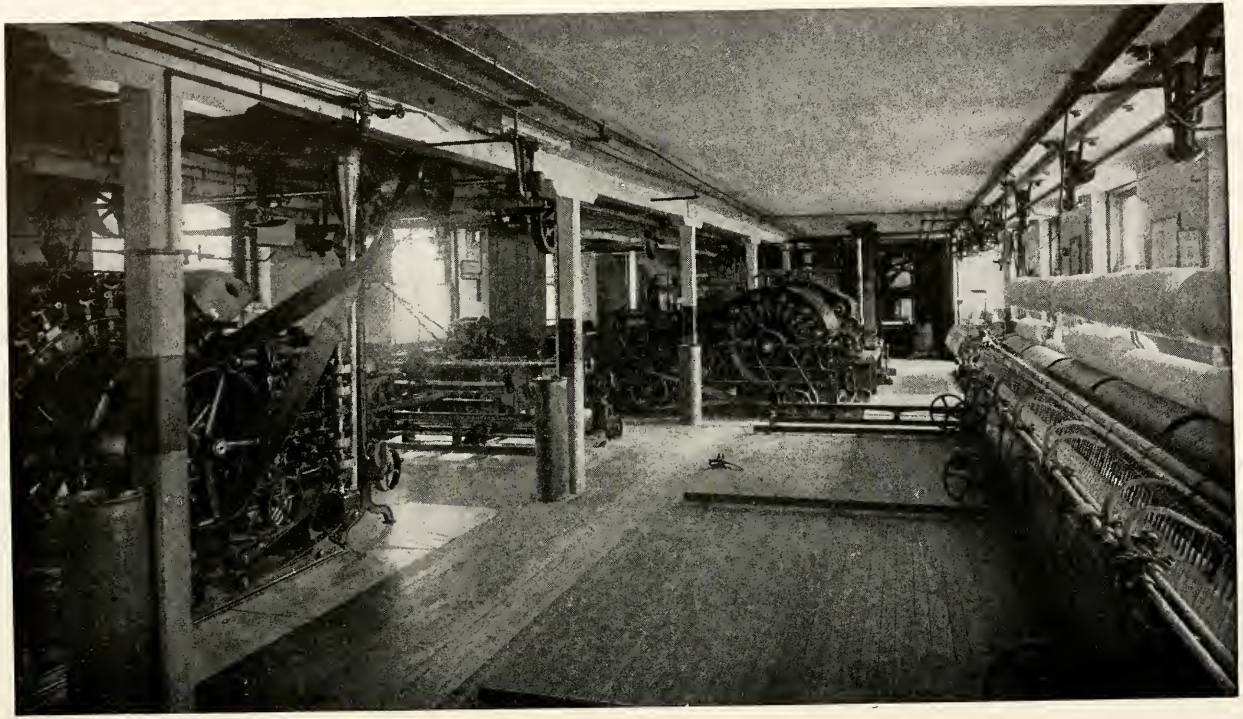
All students in the Day School, with the exception of those enrolled in the Chemistry, Dyeing and Printing Course, make upon entering the School, a deposit of $20. From this amount there is a fixed charge of $2 for those whose course includes Elementary Chemistry or Qualitative Analysis, and a charge of $4 for those whose course in addition, includes Dyeing. These charges are made to partially cover the cost of yarns, special chemicals, laboratory locker and materials in general supplied for experimental purposes.

The deposit for students of the Chemistry, Dyeing and Printing Course is $35, from which is deducted a fixed charge of $7 to partially cover cost of special chemicals, yarns, laboratory locker rental and other materials generally supplied for experimental purposes. After deducting the regular glassware breakage, or any damage to school property, the balance is returned at the end of the school year.

Should the periodical examination of accounts show, that the cost in breakage for any individual student is liable to exceed the deposits made, additional deposit will be requested, and credit for supplies withheld, until deposit is received.

LOCKER RENTAL

Students of the Day School also make a deposit of $2 for a locker key, of which amount 50 cents is refunded upon the return of the key, the balance, $1.50, being retained as rental for the use of the locker. Keys will not be redeemed unless presented within thirty days after the close of the current school year.



WOOL CARDING, SPINNING, TWISTING AND REELING LABORATORY

SCHOLARSHIPS

PHILADELPHIA HIGH SCHOOL SCHOLARSHIPS

Moderate assistance toward payment of tuition in this institution is made by the Board of Public Education of the City of Philadelphia. Pupils of all the City High Schools are eligible for these appointments, nominations for which are made by the Board of Education on the recommendation of the Principals of the several schools, to whom all applications for them should be addressed.

THE EMILIE M. CRANE MEMORIAL SCHOLARSHIP FUND

Through the will of Mr. John A. Crane a fund is provided to be known as the Emilie M. Crane Memorial Scholarship Fund. The income from this fund may be used for the assistance of students, fully qualified candidates from the advanced classes to receive first consideration.

WILLIAM WOOD FOUNDATION FUND

Mr. William Wood's sustained interest in the Textile School that he originally helped to establish, impelled him to turn over certain funds, a portion of the income from said funds to be used to assist deserving students, (Day or Evening School), in the payment of their tuition. The income is disbursed on the recommendation of the Director.

SARAH T. WISTER BEQUEST

Through the will of Mrs. John T. Wister, for years an active member of the Associate Committee of Women to the Board of Trustees of the Corporation, a Trust Fund has been provided, to be known as the Sarah Tyler Wister Prize Fund. The income from this fund to be dispersed for proficiency in the Textile School, awards from this fund to be made only at the discretion of a special Committee, appointed for the purpose.

THE HERBERT E. DAUBE MEMORIAL SCHOLARSHIP

This Scholarship consists of an annual award of $150 to a student in the last year of his course, who, in the judgment of the Director of the School, is in the need of and worthy of assistance.

Three of his more intimate associates at the School, who were in a position to more fully realize, not only his ability as a student, and his sterling qualities as a man, but also his proneness to extend the helping hand to those in need, have established this memorial, intending it to symbolize and emphasize those outstanding high qualities of their late friend.

It is the wish of the founders that recipients of this Scholarship shall have displayed those traits of character and diligence in work, exemplified by the one in whose memory it was established.

HOURS OF STUDY—Day Classes

From Monday to Friday, inclusive, all classes are in session from 9 A. M. until 12 noon, and with the exception of the second and third year classes in Warp Preparation and Weaving, they are in session from 1 P. M. until 4 P. M. The afternoon sessions in the second and third year in Warp Preparation and Weaving continue as requirements demand. The hours of study on Saturday are from 9 A. M. until 12 noon.

CONDUCT

It is assumed that students come to the School for a serious purpose and that they will cheerfully conform to such regulations as may be from time to time adopted by the Faculty.

The organization and discipline of the School require from all students a strict observance of the following regulations:

Punctual and regular attendance, polite and orderly conduct, constant and steady application to their allotted work in the various classrooms and laboratories, the return of all tools, materials, chemicals and apparatus in good order to their proper places before leaving the classrooms. Conduct inconsistent with the above, or with the general good order of the School, or persistent neglect on the part of the student to furnish or produce required work, or loitering in the hallways or wasting his time in any other manner, may be considered as sufficient grounds for dismissal, without remission of fees—or if the offence be a less serious one, the student may be placed upon probation. The student so placed upon probation may be dismissed if guilty of any further offence. Schedules showing the arrangement of classes and the hours to be given by the instructors to each are posted in conspicuous places. Students must observe these schedules and may not claim the teacher's attention at other hours.

It is the aim of the Faculty to so administer the discipline of the School as will encourage students to cultivate habits of steady application, self-control, as well as a high regard for honor and truthfulness. The attempt of any student to pass an examination by improper means will be regarded as a most serious offence, and renders the offender liable to immediate expulsion without further redress.

No book, chart, or other educational appliance which is the property of the School, will be allowed to leave the building under any circumstances.

REPORTS OF STANDING

Reports of students' standing in all subjects taken in his course are made to parents and guardians quarterly. The ability of students to continue their courses is determined in part by means of examinations, but regularity of attendance, and faithfulness to daily duties, are considered equally essential, and will be so considered.

EXAMINATIONS

General examinations are held in all branches each year in January and in May, known as "midyear" and "final." The January examinations are usually confined to the work of the first half of the year. The May examinations may cover the work of the whole year.

NOTE.—Examinations for students conditioned in May in subjects of the first and second year are held on Monday preceding the opening day of the school year, and for those students conditioned in January in the first week of March following.

Students conditioned in any subject and failing to remove the condition at the time appointed, are not entitled to another examination unless further time be allowed by special vote of Faculty.

CERTIFICATE—Day School

Certificates are awarded to students who have completed the first two years of the Regular Three Year Textile Day Course, or the first two years of the Regular Three Year Chemistry, Dyeing and Printing Courses, and to students completing any of the following Regular Two Year Day Courses: Silk—Figured Design—on the following conditions: A degree of "Excellent," "Good" or "Fair" must have been attained for the work of the Course in each branch taught in the respective classes, and the final examination must have been passed in a satisfactory manner.

NOTE—For evening class certificate see page 52.

DIPLOMAS

The Diploma of the School is awarded to students of the Three Year Regular Textile Day Course, and the Three Year Regular Chemistry, Dyeing and Printing Course, who have obtained the certificate offered for the second year of the course, and who have completed their third year's work in accordance with the conditions outlined under the head of certificates.

NOTE.—No student is eligible for promotion into an advanced class who has not completed in full, the work of the preceding year, including the examinations, in a satisfactory manner.

Students may have one transcript of records. Additional copies are $1.00 each.

SCHOOL HONORS—Prizes

The following prizes are offered for competition:

TO THE (REGULAR) GRADUATING CLASS

MEDAL OF THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS

The National Association of Cotton Manufacturers of Boston offers a medal to be awarded to such member of the graduating class of this School as may be designated by a special committee appointed for this purpose, who will examine the results of the year's work. The award will be based upon the general excellence of the year's work, and will be determined partly by an inspection of the fabrics produced by the student, coupled with the results of Preliminary and Final Examinations, and partly by consultation of the records of the student's diligence and progress during the year as kept by his instructors.

SARAH TYLER WISTER MEMORIAL PRIZES

Ten dollars.—To be awarded to the student of the graduating class who ranks second in general excellence.

Fifteen dollars.—To be awarded to the student of the third year regular day course producing the best executed work in Jacquard Design.

Ten dollars.—To be awarded to the student of the regular third year day class, attaining the highest rating for the year as regards progress and proficiency in the Department of Power Weaving.

Fifteen dollars.—To be awarded to the student of the third year day chemistry, dyeing and printing class graded as first honors in general excellence.

Ten dollars.—To be awarded to the third year student of the evening school chemistry and dyeing class who attains the highest rating for the full three-year course.

TO STUDENTS WHO HAVE BEEN IN ATTENDANCE AT LEAST TWO YEARS:

Sarah Tyler Wister Memorial Prizes

Fifteen dollars.—To be awarded to the regular second year day student producing the best executed fabric from Jacquard Design.

Ten dollars.—To be awarded to the student of the second year of the regular day course attaining the highest rating for the year's work.

Ten dollars.—To be awarded to the student of the second year day wool class attaining the highest rating for the year in general excellence.

Ten dollars.—To be awarded to a member of the second year day silk class producing the best designed and woven Jacquard Silk Fabric.

The Krout & Fite Mfg. Co. Prize

Ten dollars.—To be awarded to the student of the second year day cotton class attaining the highest rating for the year in general excellence.

The Moss Rose Manufacturing Company Prize

Ten dollars.—To be awarded to a member of the second year day silk class attaining the highest rating for the year in general excellence.

The Robert C. Boger, Sr., Prize

Ten dollars.—To be awarded to the student of the regular second year day class attaining the highest rating for the year as regards progress and proficiency in the Department of Power Weaving.

The Anna E. Sinnott Memorial Prize

Ten dollars.—For student of Second-Year Chemistry, Dyeing and Printing Class attaining the highest rating for the full two-year course.

TO STUDENTS WHO HAVE BEEN IN ATTENDANCE ONE YEAR:

The Mrs. Thomas Roberts Prize

Ten dollars.—For highest rating in the Regular Course, First Year.

The Delta Kappa Phi Fraternity Prize

Ten dollars.—To be awarded for the best general work executed on the Harness Loom, by a student of the first year day class.

The Phi Psi Fraternity Prize

Ten dollars.—For best executed work in Color Harmony and Design. Open to members of first year day classes.

The Delta Phi Psi Fraternity Prize

Ten dollars.—For general excellence in weave formation and fabric analysis. Open to members of first year day classes.

The Sigma Phi Tau Fraternity Prize

Ten dollars.—To be awarded to the student of the first year day chemistry and dyeing class attaining the highest rating for the year's work.

Sarah Tyler Wister Memorial Prize

Ten dollars.—To be awarded to the student of the first year evening Jacquard class attaining the highest rating for the year's work.

WORK OF STUDENTS

All fabrics woven in the School become the property of the institution. The School also reserves the right to retain one specimen of each student's work in each branch studied.

TOOLS AND MATERIALS

The tools required in the Regular Course, Woolen Course and Cotton Course are: A set of drawing instruments, a drawing board, a pair of pliers, a pair of scissors and a reed hook. All books, tools and also materials, such as designing paper, paints, brushes, drawing boards, drawing instruments, pencils, etc., are for sale in the School at less

than retail prices. The expense of these is usually about $40 for the first year, and considerably less for the succeeding years.

BOARD

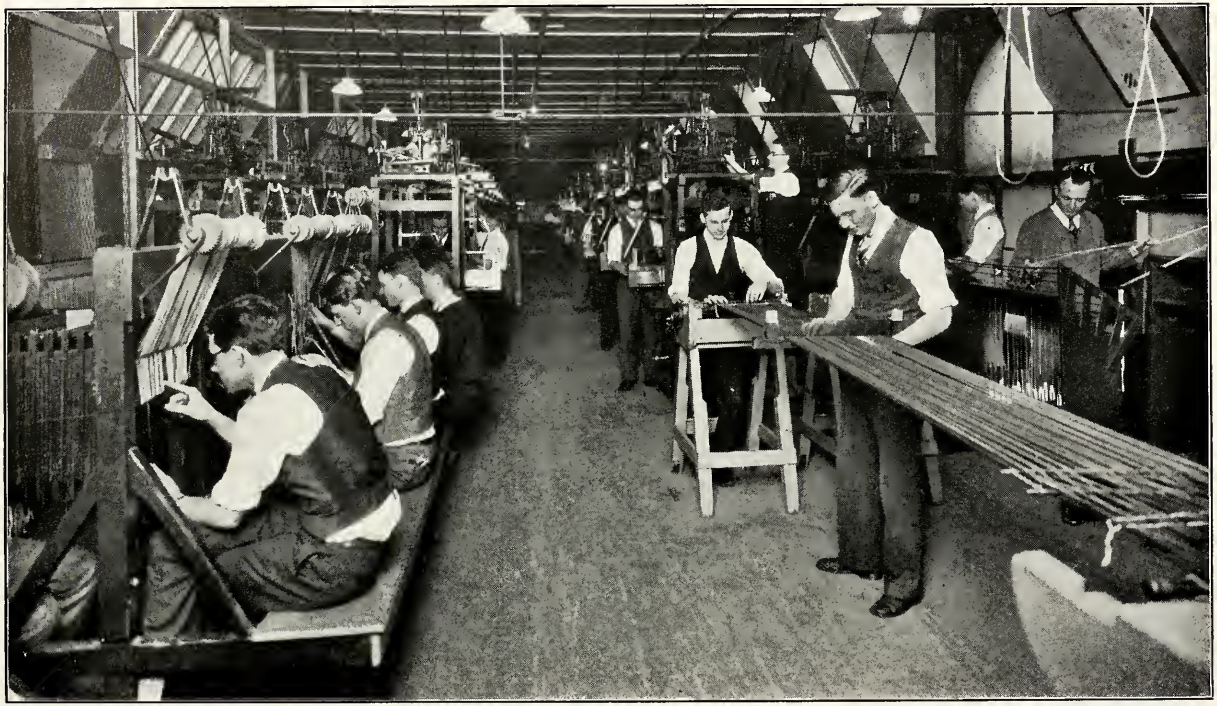
Boarding accommodation may be had in convenient locations, including the Central Branch Y. M. C. A.

SOCIAL FEATURES

The Art and Textile Club, to membership in which any student of the School is eligible, is the exponent of the social and athletic side of the school life; and is conducted and supported by and for the students.

Its equipment includes a general club room with files of textile and other periodicals; tables for chess and checkers; also pool tables of standard make.

The membership fee is $8 a year, and is collected by the Registrar of the School from Textile day students when registering for the year.



HAND WARPING AND WEAVING ROOM

All operations of Warping and Elementary Weaving are here performed by the students

Explanation of Subjects Included in the Courses, Embracing Silk, Cotton, Wool and Worsted

Instruction in these subjects is planned so that each forms an important part of the whole, the full value of any one of them being dependent upon a knowledge of the others. Experience has proved that this grouping of studies affords an unexcelled opportunity for laying a foundation such as will best enable the student to successfully specialize after graduation, it being generally admitted that specialization attains its greatest ends when supported by a broad knowledge of the industry in general. To speak more directly of the work of the school itself, the system of instruction under which it is organized is the result of years of experience, and is continually subjected to such revisions and additions as experience suggests. The following gives a general idea of the scope of these studies:

WEAVE FORMATION

Embodies at the start the study of the different methods of interlacing threads to form weaves, without especial reference to particular fabrics. There are thousands of different weaves, each with its peculiarities; some suited to this fabric, and some to that; some few which might produce a desired effect, and many others which would be far more efficient in other styles. It is indispensable that these many varieties of weaves should be learned in a thorough manner before going into the more difficult work of combining and utilizing them in the fabrics for which they are best adapted.

After carefully considering the various weaves, with their accompanying peculiarities of take-up of the warp in weaving, and their capacity for taking few or many warp threads per given space, the next step is their combination for fancy single-cloth weaves for all classes of fabrics. Following these come weaves with the addition of an extra warp or an extra filling, leading up to double cloths and ultimately to even more intricate forms of interlacings. The principal truth to be realized by every prospective student of design is the prime necessity of becoming thoroughly familiar with the alphabet of the subject before trying to work on any particular class of goods. Obtain a thorough grounding in principles at the start, and the subsequent problems will be solved with a degree of skill and facility impos-

CLASS ROOM FOR FIGURED DESIGNING

The great value of drawing becomes apparent to the student, as the commercial value of his production is increased by artistic method

sible otherwise. All lectures are supplemented by illustrations, consisting of specimens of different goods containing the weaves, discussed for the purpose of showing the difference between the design on paper and the woven fabric. This trains the mind to a true conception of the woven product with regard to size of pattern, texture and general appearance.

ANALYSIS AND STRUCTURE OF FABRICS

The first step in this subject is the study of the methods of grading yarns as to size, and the calculating of various lengths and weights. Then follows the analysis of specimens of fabrics touched on in the study of weave formation. Here the student has the opportunity of observing the weaves under various conditions of texture, coloring and finish. Among the different things to be ascertained by the student are the weave, number of warp and filling threads per inch, coloring, take-up in weaving, counts of the different yarns, shrinkages, etc., so that a close estimate can be made of the weight of materials necessary to produce a given piece of goods.

The structure of fabrics is a subdivision of the subject, including the planning of every detail of the specifications necessary in the production of woven goods, including design, color, material, quality and quantity, directions for placing in the loom and for finishing. These specifications embrace a variety of fabrics, and, as the student actually produces goods from many of them, he is enabled to see the effect of his plans in the various details of manufacture and to note defects he could not have appreciated otherwise.

WEAVING

Under this heading are included such subjects as dressing, warping, beaming, drawing-in, reeding and chain building, as well as the actual operation of the loom. All of the preceding operations are carried on by the student after he has prepared full specifications of the fabric to be produced. The aim is to confine the goods to be woven to such principles as have been acquired in the studies of design and analysis. Thus each of these three branches regulates the progress in the others, and serves to impress and strengthen them by united systematic work. Much stress is laid on the necessity of care in every detail of the preparation of the

EXHIBITION ROOMS SHOWING STUDENTS' WORK

warp for the loom, not only in the arrangement of the threads on the beam, but in the condition of the heddles and harness frames themselves, with reference to the intermediate and advanced classes. The timing and setting of the looms so as to produce the best results in the fabric is considered in each case. The students are required to do all of the necessary work, seemingly irksome and laborious at times, not with the idea of making weavers of them, but thoroughly to acquaint them with the full details, so that they may become intelligent producers of woven fabrics.

YARN MANUFACTURE

Of equal importance with the preceding subjects is the study of yarn manufacture, which includes all the operations incidental to the finished yarn, from the selection and grading of the raw stock. The production of wool, cotton and worsted yarns is thoroughly studied, both in theory and in practice. In this, as in weaving, the machines used for demonstrating are the best to be obtained, regardless of the name of the maker.

The chief advantage of school training in this subject does not lie in the actual operation of machines, but rather in the knowledge of how to adjust the parts of the machines to suit varying conditions necessitated by different lengths of fibre and counts of yarn, in order that the machines may be run to the best advantage. The use and structure of each portion of the machines is studied in its relation to the other parts with reference to its effect on the product. Starting with the desire to produce a certain yarn, all the necessary calculations of speed and delivery are made, so that the proper amount of work may be done at each operation and the fibre handled with the least amount of injury and waste. The knowledge of how to blend fibres and produce yarns makes the person who is also familiar with designing and weaving exceptionally valuable, either as designer, as overseer of weaving or of carding and spinning, or in those positions in which men are expected to superintend all three of these operations.

Knitting is studied in connection with this subject, with the aim of giving the student a knowledge of the general principles of knitting of wool, cotton and silk, and a familiarity with the practical working of knitting machines, ribbers and loopers.

TEXTILE COLORING

This subject is one of vital importance to the manufacturer of textiles, for, in spite of good design and good fabric, if the coloring is not pleasing the fabric will not sell. A thorough course in this subject, relating entirely to textiles, is a prominent feature of the school's work. While the principles of color are the same, whatever their application, the course of study is so arranged as to bear entirely on yarns and fabrics. Starting out with the raw pigments, and working on paper and in the actual goods, the eye of the student undergoes a gradual and almost unconscious training in the application of what is good and what is bad in color combination. He becomes able to decide not only on what colors or shades may be tastefully combined, but also on the relative depths of shade which will be allowable under given conditions and in given combinations. His knowledge of the structure of fabrics and of design enables him to estimate correctly the quantity and quality of the color which will be visible on the face of the goods and to make correct allowances in his original color scheme for the modifications of effect which these conditions imply.

FIGURED DESIGN

Is an outcome of and is dependent on the instruction in fabric structure and design. Its object is not to teach the make-up of the fabrics, but to adapt certain principles already learned to the capabilities of the Jacquard machine. The working up of sketches for the loom, together with the painting of various schemes of suitable coloring, is the principal aim. The methods of selecting the proper squared paper are considered, and the sketch is transferred to the squared paper and worked up according to certain preconceived ideas. Instruction is given in the principles of the different kinds of Jacquard machines, the methods of tying them up and of cutting the cards to suit the different tie-ups. The prevailing tendency toward fancy fabrics, with larger and more varied effects, serves to emphasize the necessity of an acquaintance with this continuation or outgrowth of the harness loom. In fact, a man cannot be considered well posted in weaving unless this knowledge of weaving mechanisms embraces the Jacquard machine as well as the head motion, the dobby, the witch and the cam motion.

CHEMISTRY

Few lines of industry deal with more valuable and perplexing as well as varying materials than those used in the textiles, and, strange though it may seem, it is, nevertheless, true that most of those who have in hand the manufacture and manipulation of the textile fibres, know comparatively nothing, concerning their physical structure and properties. That they can easily be rendered unfit for the purposes of manufacture by unskilled handling, and that the men whose business it is to cleanse and dye them are too often entirely ignorant of their chemical nature, are among the most stubborn facts with which the textile manufacturer has to deal. It would be logical to suppose that those who have in charge the carding, spinning, dyeing, weaving and finishing should have an intimate scientific knowledge with respect to the fibres they are constantly handling, but as a rule these persons have had little or no opportunity to receive their instruction in fibre technology. A thorough course of instruction in this subject is now given, including a chemical and microscopical study of the characteristic features and properties of the important fibres. In addition to this, the various chemicals employed in scouring, dyeing and finishing are studied with reference to their action on the fibres, and also with a view of determining their purity and commercial value. The chemical principles involved in textile processes are scientifically studied. Of course, the main object in scouring, dye, bleaching, etc., is to attain quality and quantity in results; but how can we better regulate, adjust and improve these results than by a study of the basic principles? The chemistry taught begins with the elementary forms, and is pursued through the higher forms of qualitative, quantitative and technical analysis and organic chemistry.

DYEING

Dyeing is an art immediately associated with chemistry, being one of the chief ramifications of that fundamental science. The application of chemistry has had the effect of not only revealing the reasons for the actions of the old dyes, but has developed thousands of new stuffs, and has brought the art of dyeing into the front rank of applied sciences.

The course of study is carried on with the idea of inculcating into the mind of the student a scientific con-

VIEW IN MAIN DYE HOUSE

Showing sections for experimental dye testing, skein yarn and piece goods dyeing

ception of what he is doing, and at the same time the practical side of the question is given due consideration. The experiments are not limited to the laboratory pot and kettle, where the results are too often deluding, but the student carries on his dyeing on a scale and in a manner that enables him to encounter and overcome the petty difficulties and changing conditions of the mill and dye house.

The technical examination and valuation of commercial products is given especial attention. The course of study also involves a consideration of the different methods of dyeing the various fibres, both animal and vegetable. The most important of the modern dyestuffs are applied to various forms of textiles such as loose stock, yarn and cloth. A study is also made of the new processes of dyeing which are being constantly introduced, as well as of the mechanical appliances which many of them necessitate.

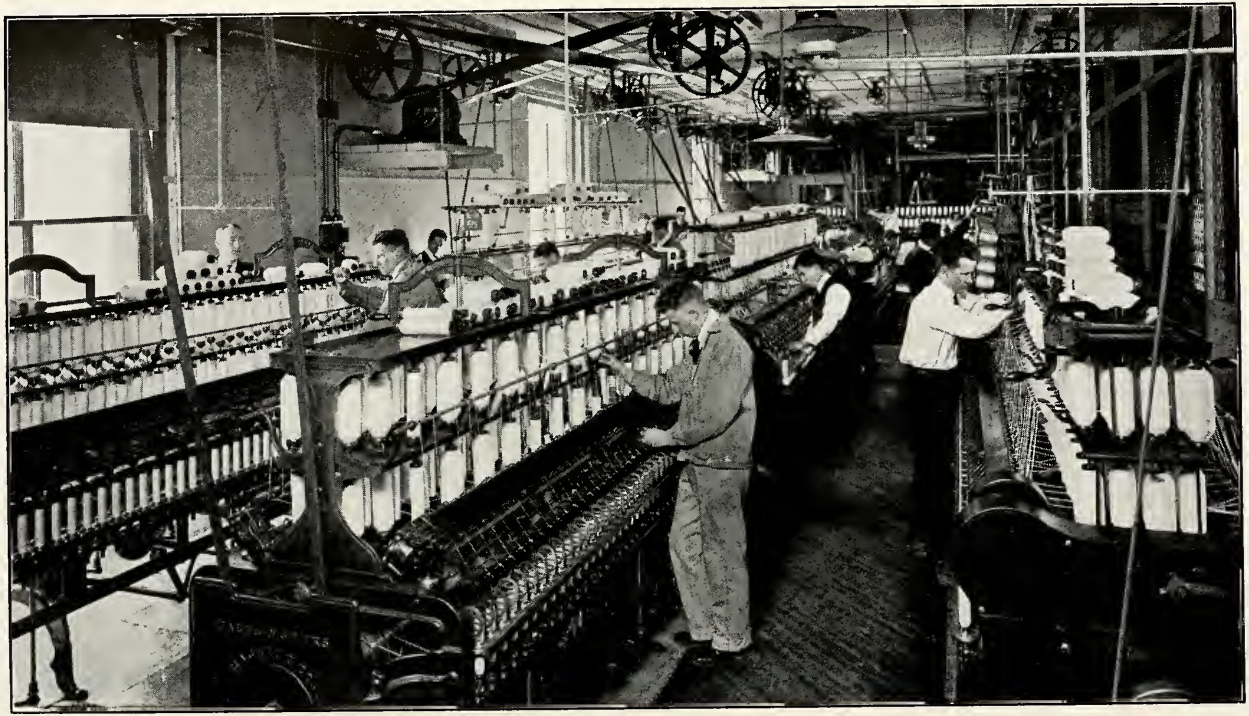
The study of chemistry and dyeing is of particular value to dry-cleaners and garment dyers. This branch of the industry is of necessity varied in character, and it is hard to place too high an estimate on the value of a school course to the worker in this field.

FINISHING

Is treated throughout the larger part of the term in lectures, and at the latter part the many fabrics produced in the school are put through the processes of finishing necessary to bring them out as articles of commerce. It is well known that, no matter how carefully and perfectly a piece of goods may be produced, if it is not handled intelligently in the finishing process, all previous care will be for naught. In fact, in the case of many classes of fabrics, the goods, as they come from the loom, are rough and uncouth, depending entirely on the finisher, with his possession or lack of skill, to bring out a salable article.

ADDITIONAL LECTURE COURSES

Through the cooperation of the Business Section of the Wharton School of Finance and Commerce, of the University of Pennsylvania, two additional, and special lecture courses, have been added to the curriculum of the Third Year (Senior) classmen. Each course covers a period of twenty (20) one-hour periods. The topics are: "Problems in Textile Economics," and "Cost Accounting in Textile Mills." Attendance of third year classes required.

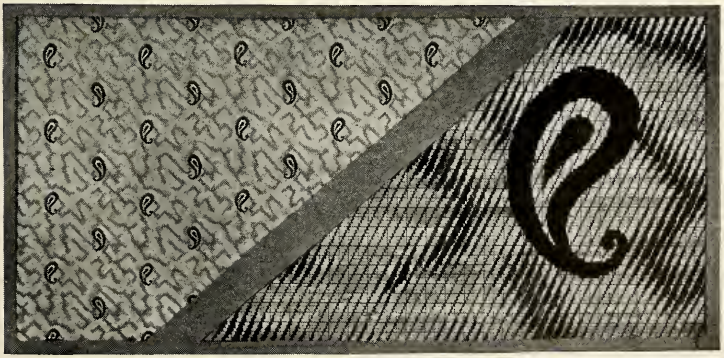


COTTON CARDING, DRAWING, SPINNING AND TWISTING LABORATORY

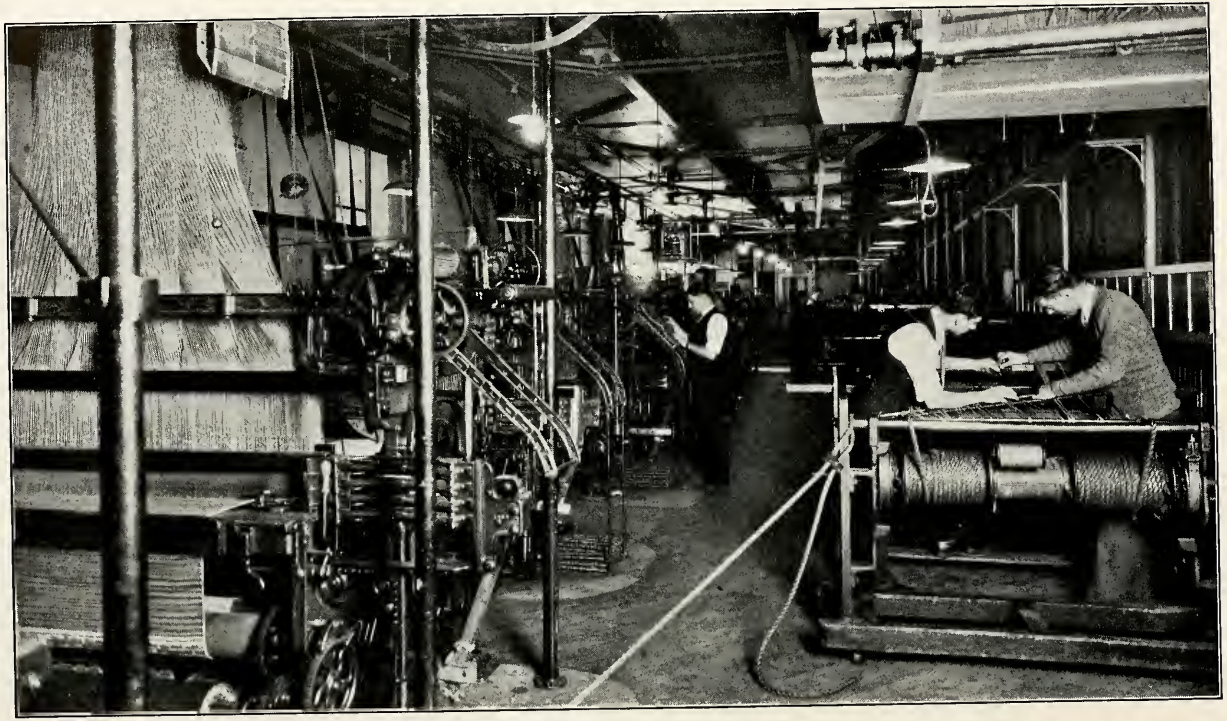
NOTE

In a brief manner we have suggested the different branches into which the subject of textile education has been divided, each dependent on the other, and have outlined some few of the reasons why a young man should include them all in his course of study. If a more extended outline of them or any other information relative to the school is desired, application should be made for the complete circular. We would earnestly advise that all who contemplate taking the course should, if possible, visit the school and inspect its methods and become acquainted with its results.

The graduates of the school, however, are so widely scattered that persons who are looking into the textile school question may, on request, be given the names of several former students in their vicinity, with whom they may confer relative to the school. This course is often thought advisable if one has not the time for a preliminary visit to the institution.



FANCY FIGURED SILK, SHOWING SECTION OF WORKING DESIGN AND FINISHED PRODUCT



VIEW IN MAIN POWER WEAVE ROOM

Honors Received by the School for Exhibits of Students' Work at Expositions

1884—The World's Industrial Cotton Centennial Exposition, New Orleans:
Diploma of Honor.

1893—The World's Columbian Exposition, Chicago:
Diploma of Honor—Bronze Medal.

1895—Cotton States and International Exposition, Atlanta, Georgia:
Diploma of Honor—Gold Medal.

1901—Pan-American Exposition, Buffalo:
Diploma of Honor—Silver Medal.

1902—South Carolina Interstate and West Indian Exposition, Charleston:
Diploma of Honor—Gold Medal.

1904—Louisiana Purchase Exposition, St. Louis:
Diploma of Honor—Gold Medal.

1926—Sesqui-centennial International Exposition, Phila.
Grand Prize—Diploma of Award—Gold Medal.

Evening School

In order to allow those employed during the day to receive some of the benefits and profit by the facilities for study which this School may afford, courses covering all branches of general textile instruction have been arranged to be carried on in the evening. Obviously the strongest appeal for study along these lines is to those men who are engaged in some form of textile work, they being aware of the business progress that in the past has been made by men who have taken evening courses, and who now are prominent in the textile field.

Another class of men, just out of either school or college, with no fixed plans for life work, but having some form of day employment, takes advantage of the evening classes as a means of definitely learning something of what textile education may hold for them. Many of these men awake to the breadth of the field, the tremendous importance of the industry (second only to food stuffs), and its many opportunities.

The young man who has ordinary ability and the training afforded by a good textile school usually finds himself well qualified, after a little experience, to assume almost any responsible position in the textile industry, and its allied trades.

Among the many occupations open to him are those of: designer—assistant designer—overseer of weaving—overseer of spinning—superintendent—assistant superintendent—chemist in the mill—chemist in the dyestuff factory—foreman dyer—foreman bleacher and finisher—salesman of yarns—woven goods—dyestuffs or mill supplies—buyer of cloth—special assistant to manufacturers of clothing—style expert—and so on.

Every department store must have men—whether buyers or examiners—who "know" textiles. Every large mail order house must do the same. Even the government cannot get along without men who "know" textiles.

GENERAL INFORMATION

REQUIREMENTS FOR ADMISSION

Applicants for admission to any of the evening classes should be at least 18 years of age and prepared to satisfy the Director of the School or Head of the Department that they will profit by attendance at any of the classes to which they may be admitted.

Applications for enrollment may be made in person or sent to the School by mail at any time after July 1st, but preference for enrollment will be given to those applicants who make payments between 9 A. M. and 4 P. M., September 1st to 30th, inclusive. The evening of September 29th, from 7 to 9 P. M., is set apart for the receipt of applications and fees for places in classes not previously filled.

To comply with regulations of the Pennsylvania State health laws, a certificate of vaccination must accompany each application.

TUITION FEES

Tuition fees for the evening students are stated in conjunction with the various subjects of study outlined on pages 59 to 68, and are payable in advance.

DEPOSITS

Students of the Evening Classes in Dyeing, Elementary Chemistry and Qualitative Analysis make, on entering, a deposit of $15, from which sum is deducted fixed laboratory charges of $2 to partially cover costs for yarns and materials used in dyeing, $1 for locker rental, $1.50 for special chemicals, and in addition a minimum charge of $1.50 is made for depreciation of apparatus used.

Students of the course in Quantitative Analysis make a deposit of $20. After deducting the aforesaid charges, including breakage, the balance is returned at the close of the school session.

LOCKER DEPOSITS

Students of the Regular Textile Evening School make a deposit of $1.50 when they are supplied with a locker. Fifty cents of this amount is refunded, provided the key is returned within thirty days after the close of the School year.

SUPPLIES

Students must provide themselves with the necessary note books, designing paper, paints, brushes, and other materials, as indicated by the Lecturers and Instructors in the respective classes. These materials are for sale in the School at less than retail prices.

HOURS OF STUDY

The Evening Classes are in session from 7.30 until 9.30 on Monday, Wednesday and Friday evenings.

Note Calendar on page 9 for length of term and holidays observed.

EXAMINATIONS

Examinations are held at the close of year or term in all subjects taken in the Regular Courses.

CERTIFICATES

Two grades of certificates are awarded, as follows:

A Full Course Certificate to those students who have completed three years of study in certain prescribed groups of studies. Among the requirements are a complete orderly record of the work as given by the instructor; an attendance of at least 75 per cent. of the time the classes are in session; and the passing of the final examinations.

A Partial Course Certificate to students who have completed in a satisfactory manner, including the final examinations, the following special studies:

Weave Formation.....three years
Figured Design.....two years
Fabric Analysis and Calculation.....three years
Cotton Yarn Manufacture.....one year
Wool Yarn Manufacture.....one year
Worsted Yarn Manufacture.....one year
Silk Fabric Analysis.....one year
Raw Materials of the Wool Industries..one year

MERIT SCHOLARSHIPS

A merit scholarship is awarded to the evening student attaining the highest rating for the year's work, including the final examinations, in both the first and second year Regular Textile Course.

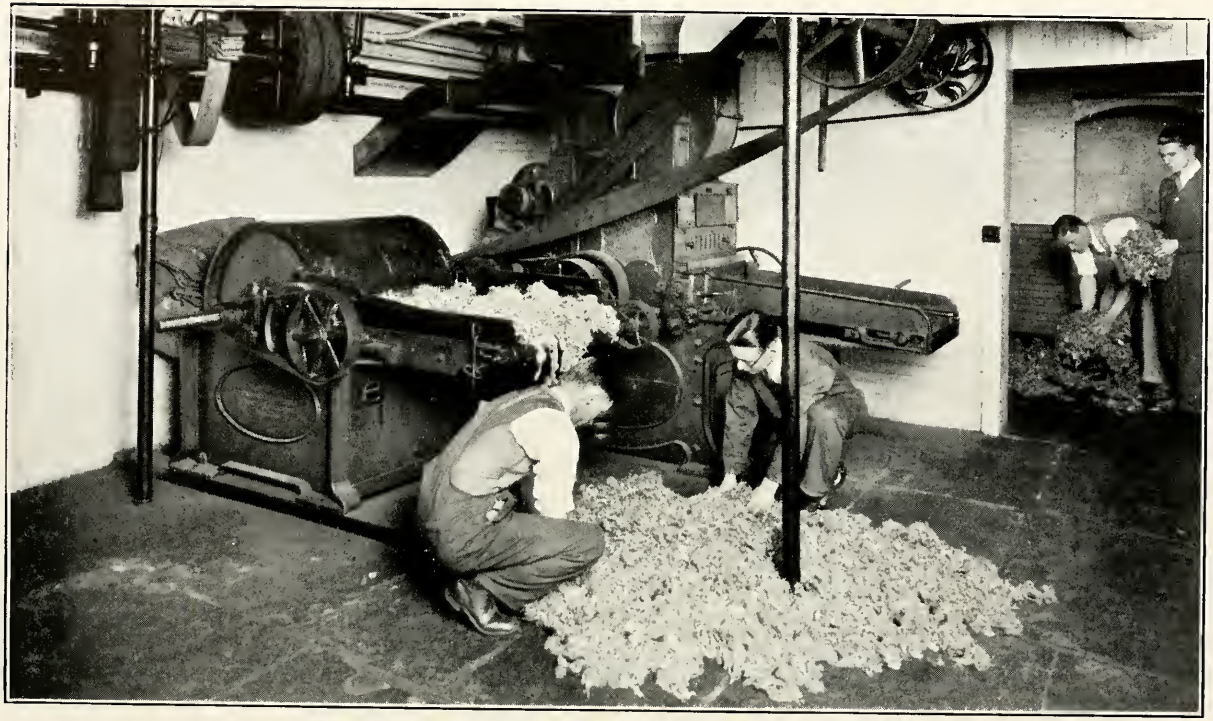
Evening School Schedule of Subjects

MONDAY	WEDNESDAY	FRIDAY
Elementary Weave Formation and Fabric Structure	Intermediate Weave Formation and Fabric Structure	Advanced Weave Formation and Fabric Structure
Intermediate Calculations and Fabric Analysis	Advanced Calculations and Fabric Analysis	Elementary Calculations and Fabric Analysis
Woolen Yarn Manufacture (Advanced)	Elementary Warp Preparation and Weaving	Loom Fixing and Study of the Power Loom
Advanced Jacquard Design and Card Stamping	Hosiery Knitting	Elementary Jacquard Design
Raw Materials of the Wool Industries and Calculations	Woolen Yarn Manufacture (Elementary)	Worsted Yarn Manufacture Drawing and Spinning
Advanced Textile Coloring	Elementary Textile Coloring	Cotton Yarn Manufacture
Advanced Cotton Yarn Manufacture	Chemical Laboratory	Lecture in Elementary Chemistry
Chemical Laboratory	Dyeing Laboratory	Dyeing Laboratory
Lecture in Elementary and Advanced Dyeing	Lectures on Modern Textiles	Chemistry Lectures Laundry Course
Special Jacquard Design and Card Stamping	Special Jacquard Fabric Analysis and Construction	Textile Chemistry
Silk and Fine Cotton Fabric Analysis and Calculations	★	★
Textile Fibres	★	★

Courses of Study

The following are the regular courses and are recommended as advantageous outlines of study. If, however, a person does not desire to follow any of these courses, preferring to confine his attention to certain of the subjects which are given on pages 59 to 68, he can do so in accordance with the schedule shown on this page.

See page 64 for special Jacquard and silk work.



SECTION OF WOOL PREPARING ROOM, SHOWING BURR AND MIXING PICKERS

Course A (Annual Fee $45)

This course is recommended to those who are interested in cottons.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Warp Preparation and Weaving	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Cotton Yarn Manufacture
Third Year	Advanced Cotton Yarn Manufacture	Hosiery Knitting	Advanced Weave Formation and Fabric Structure

Course B (Annual Fee $45)

This course is recommended to those who desire to study the application of Jacquard Designs to Textiles in general.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Woolen Yarn Manufacture (Carding)	Elementary Jacquard Design
Second Year	Advanced Jacquard Design	Intermediate Weave Formation and Fabric Structure	Worsted Yarn Manufacture
Third Year	Advanced Textile Coloring	Elementary Textile Coloring	Advanced Weave Formation and Fabric Structure

Course C (Annual Fee $45)

This course is recommended to those who are interested in both cottons and woolens.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Warp Preparation and Weaving	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Loom Fixing and Study of the Power Loom
Third Year	Raw Materials of the Wool Industries	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course D (Annual Fee $45)

This course is recommended to those who are particularly interested in wool and worsted stuffs.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Woolen Yarn Manufacture (Carding)	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Structure	Intermediate Weave Formation and Fabric Structure	Worsted Yarn Manufacture
Third Year	Raw Materials of the Wool Industries	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course E (Annual Fee $45)

This course is arranged for those who desire to give special attention to upholstery and similar Jacquard work.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Textile Coloring	Elementary Jacquard Design
Second Year	Advanced Jacquard Design	Intermediate Weave Formation and Fabric Structure	Elementary Calculations and Fabric Analysis
Third Year	Special Jacquard Design Card Stamping and Coloring	Silk and Fine Cotton Fabric Analysis and Calculations	Advanced Weave Formation and Fabric Structure

Course F (Annual Fee $45)

This course is recommended to those who desire to couple the study of Jacquard design with that of general fabrics.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Textile Coloring	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Elementary Jacquard Design
Third Year	Advanced Jacquard Design	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course G (Annual Fee $45)

Breakage Deposit, $15. See Deposits, page 51.

This course is arranged for those who desire to specialize in the study of chemistry and dyeing, both in theory and practice.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Chemical Laboratory	Chemical Laboratory	Chemistry Lecture
Second Year	Lecture Elementary Dyeing	Dye Laboratory	Dye Laboratory
Third Year	Advanced Dyeing Laboratory	Dye Lecture	Dye Laboratory

Course H (Annual Fee $45)

Breakage Deposit, $15. See Deposits, page 51.

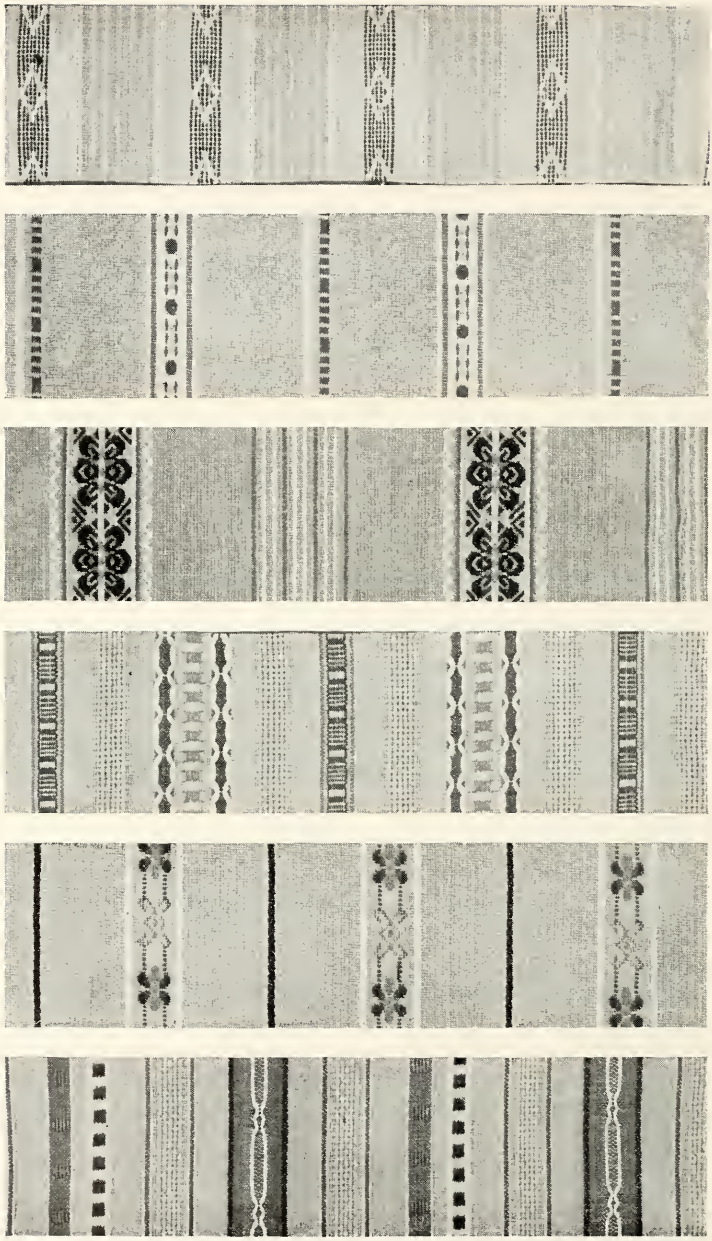
		MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Chemistry	Laboratory	Laboratory	Lecture
Second Year	Qualitative Analysis	Laboratory	Lecture	Laboratory
Third Year	Quantitative Analysis	Laboratory	Laboratory	Lecture

Course L

($45 for First & Second Year; $30 Third Year)

This course is specifically provided for laundry owners and associates. See page 68.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Chemical Laboratory	Chemical Laboratory	Chemistry Lecture
Second Year	Chemical Laboratory	Dye Laboratory	Lecture
Third Year		Chemistry and Dye Laboratories	Lecture



THE ABOVE ARE TYPICAL SPECIMENS OF COTTON, SILK AND RAYON FANCY DRESS AND WAISTING MATERIALS, PRODUCTION OF SECOND YEAR CLASSES

Subjects of Study and Fees

The following fees are for individual studies. The fee for a Full Certificate Course is $45 (for the term of approximately six months) according to the character of the subjects included.

WEAVE FORMATION

Divided into Elementary, Intermediate and Advanced, each division requiring one year.

General principles of the structure weaves.—Explanation of "Warp" and "Filling."—Methods of representing weaves on squared paper.—Classification of weaves.—Foundation and derivative weaves.—Plain weave and the methods of ornamenting it.—Methods for constructing the various twill and satin weaves.—Influence of the twist of yarn on the effect of the weave.—Explanation of drafting.—Rules for preparing drawing-in drafts and chain drafts from weaves.—Reducing weaves to their lowest number of harnesses.—Various weaves derived from the "Foundation Weaves."—Methods for their construction.—The various fabrics to which they are adapted.—Circumstances which make it more advantageous to use one class of weaves than another.—Weaves which are suitable for particular classes of fabrics in contrast with weaves for other classes.—Weave combination.—Consideration of "Texture" and "Take-up" in placing weaves together.—Combining weaves to form stripes and checks.—Effect of color on the weave.—One-and-one and two-and-two systems.—Two-and-two and four-and-four applied to fancy weaves.

The Intermediate and Advanced classes naturally follow on with the higher classes of fabrics. Fee for this subject, two hours per week for the term, $15.

ELEMENTARY WARP PREPARATION AND WEAVING

Requiring one year.

The subject is taught as a means of demonstrating and developing the instruction given in weave formation and fabric structure, and while keeping this idea in view, due attention is also paid to the giving of a thorough grounding in the underlying principles of weaving and weaving mechanism. Experience has proven that these ends are most rapidly attained by means of the foot power hand loom, and for this reason each student has the use of such a loom of especial construction, with a capacity of 30 harness, 4 x 4 boxes. By means of this loom he produces fabrics, studies the relation of weave, yarn, texture, take-up and cover, together with the proper conditions of warp line, tension, height of shed, throw of shuttle, beat of lay, etc., all of which are under his personal control.

Fee for this subject, two hours per week for the term, $15.

CALCULATIONS AND FABRIC ANALYSIS

Divided into Elementary, Intermediate and Advanced, each division requiring one year.

Cotton, wool, worsted, silk and other varieties of yarns and fabrics are carefully investigated and discussed with a view to the formation of desired fabrics. A brief outline of the plan of work is here appended.

YARN CALCULATIONS—Grading yarns with regard to size.—Consideration of the various systems in their relation to one another in one or more ply threads. The relation of count, weight and length of different threads.

FABRIC ANALYSIS—Ascertaining the weave, drawing-in draft, chain draft, ends and picks per inch, arrangement of warp and filling colors, counts of warp and filling, take-up in weaving.—Amount of each color and material required in a given length of goods.

FABRIC STRUCTURE—Is studied in part by observation and deductions based on the results obtained in the thorough analysis of fabrics which may be remarkable for their good or bad qualities. This subject also includes the organization of specifications, designs and colorings for prescribed fabrics, the majority of which are executed by the student, thus enabling him to see the actual result of his thought.

Fee for this subject, two hours per week for the term, $15.

THE STUDY OF THE POWER LOOM

(Special Loom Fixing Class)

This course covers a period of one term or year, and is carried on by means of Lectures and Practical Demonstrations. The subjects considered are partly covered by the following:

The Power Loom.—The principles governing its parts.—Relation and timing of the parts.—The various shedding mechanism, cam motion, cam and scroll motion, dobby motion.—Open and closed shed looms, and the advantages of each.—The various picking motions, the alternating pick, the pick and pick, cam and cone, sliding pick motion.—Shuttle box motions, raise and drop box, skip box, circular box, boxes controlled by cams, by a chain and by the Jacquard.—Rules and calculations for change gears for the various take-up motions.—Ascertaining desired speed of shafting and size of pulley for given speed of loom.—Timing and setting of the box motions of the Knowles, Crompton, Wood, Furbush, Schaum & Uhlinger, Stafford and Whitin looms.—Knock-off motions.—Fast and loose reeds.—Harness and box chain building and care of stock.—Multiplier box building.—The Jacquard machine and its many forms of use.—Mounting and adjusting of single-lift, double-lift and special Jacquards.

Fee for this course, two hours per week for the term (six months), $15.

COTTON YARN MANUFACTURE

One year is required. Fee for this course, two hours per week, for the term, $15. *A second year is strongly advised* for those desiring special advanced work, particularly with regard to pickers, combing, spinning, twisting, and the self-acting mule. The following is an outline of the scope of the subjects given in the first year:

Varieties of Cotton.—Their characteristics and uses.—The adaptation of various cottons to different classes of work.

Preparatory Processes.—Bale breakers.—Mixing lattices.—Openers.—Intermediate and finisher pickers.

Carding.—The theory of carding carefully studied.—Brief outline of the various methods of carding, with a thorough study of the construction and working of revolving flat cards.—The necessary settings and adjustments, together with calculations for all changes in the speeds of the different parts.

Card Clothing.—The essentials of good carding.—The principle of grinding and the practical accomplishments thereof.

Combing.—The process briefly outlined, showing its use and place in the order of operation. Considered fully in the second year.

Railway Head.—Its functions and advantages.—Calculations for necessary changes.

Drawing.—The object of drawing.—Functions of the drawing frame.—Different types of frames in use.—Rules for all changes.

Fly Frames.—Slubbers.—Intermediates.—Fine roving frames.—Their functions, similarities and differences.—The theory of winding.—Differential motions of Holdsworth, Tweedale, Daly, and others.—Rules and calculations for changes.

Spinning.—The theory of spinning.—The mule and ring frame.—Spindles, travelers, rings, builder motions.—Calculations for draft and twist, and production.

Fee for this course, two hours per week, for term, $15.

RAW MATERIALS OF THE WOOL INDUSTRIES

one year—is given by means of lectures and practical demonstrations, which occur weekly.

The wool fibre.—Structure.—Properties and characteristics.—Classes of fleece wool.—Merino types.—Territory wools.—Wools from British breeds.—Long wool and medium wool.—Crossbreds.—Carpet wools.—Necessity for grading and sorting.—Various qualities in fleeces.—Skirting.—Mill methods of designating sorts.—Comparative wool grades.—Sorting tests.—Grades of wool from various breeds of sheep.—Cause of shrinkage.—Shrinkage of various wools.—Shearing.—Preparing.—Marketing.—Pulled wools.—Source of supply.—Methods of pulling.—Uses.—Distinction between hair and wool.—Mohair.—Alpaca.—Vicuna.—Llama.—Cashmere.—Camel hair.—Horse hair.—Wool substitutes and waste products.—Importance and necessity.—Essential requirements in raw materials for manufacturing.—Text Book: "The Raw Materials Used in the Wool Industries," by S. H. Hart, will be used.

Note.—Wool scouring and drying considered under Chemistry and Dyeing.

Fee for this subject, two hours per week, for the term, $15.

WOOL YARN MANUFACTURE

One year is required.

Preparatory Processes.—Burring and picking.—Consideration of the various burring and picking machines in general use.—Preparation of mixes and methods adopted in laying down mixes according to desired percentages.—Oiling the mix.

Carding.—Theory of carding.—Explanation of the term "set of cards."—Names and uses of the various rolls and cylinders.—Truing up of cylinders.—The necessary settings and adjustments, together with calculations for changes in the speeds of the different parts.

Card Clothing.—The essentials of good clothing.—Construction, classification, and uses.—Methods of clothing the various rolls and cylinders.—The principles of grinding and the practical accomplishments thereof.—Frame, traverse and roll grinders.

Feeds.—Hand, ball, creel, and automatic feeds carefully considered.—The construction and adjustments necessary for the satisfactory operation of the Bramwell, Apperly, Scotch, Tindel, Fischer, etc.

Condensers.—The various forms of condensers in general use.—Ring system.—Single and double doffers.—Bolette single doffer.—Steel blade dividers.—German single doffer strap dividers.

For those desiring more advanced study, particularly relating to the spinning of the roving into a desired yarn, the variable functions and feasibilities of the "woolen mule" and the necessary changes and calculations, a second year is strongly advised. Fee for this course, two hours per week, for term, $15.

WORSTED YARN MANUFACTURE

One year is required. This course is carried on largely through lectures and practical demonstration—on the machines themselves. All the necessary calculations required in the above processes are thoroughly demonstrated.

Spinning.—Principles of spinning on the flyer, cap and ring spinning frames.—Worsted mule spinning.

Doubling and Twisting.—Principles of twisting.—Twisting, as performed on the flyer, cap, throstle and ring frames.—Effect of too much or too little twist in first or second operation.

Calculations in Full.—Drafts, doublings, stop motion for gilling and drawing.—Working out a set of drawings for any given count.—Gauge points or constants for all practical purposes.—The slide rule, and how to use it in working out drafts and other calculations.—How to find "constant" and how to use, and why.—Twisting.—Reeling.—Straight and cross reeling, also weight yarn.

General.—Oiling of the wool.—Breaking wool.—Fallers.—Ratch-drag of bobbins, lifter motion or builders.—Stop motions.—How to weigh yarn.—Averaging slubbing to make yarn weigh even.—Causes of imperfect yarn.—Lumps.—Slugs.—Double.—Single.—Twitty.—Overdrafted.—Dragged too hard.—Too much or too little speed.—Features to be considered in laying out and equipping a worsted mill, including power transmission, heating, ventilating, humidity and fire protection.

Fee for this subject, two hours per week, per term, $15.

TEXTILE COLORING

One year is required. The particular something which makes a textile fabric attractive. A point of utmost importance to every one who helps to manufacture or market the product of the mill. Without color, good patterns become flat and possess no charm; with good color, inferior patterns become leaders.

Use of pigments to illustrate color problems.—Tone values.—Hue changes. Modifications of color due to mixtures.—Changes in color on account of position and area.—Classes of textiles.—Groups of color arrangements.—Actions of colors on each other.—Practical tests of color sensibility.

Matching of colors in yarns and fabrics.—Detection of color changes.—Training the eye to detect color changes and tone changes.

Color sketches for striped patterns.—Color sketches for checked and plaid patterns.—Figured patterns for prints and Jacquard fabrics

Fee for this subject, two hours per week for the term, $15.

FIGURED DESIGN

Divided into Elementary and Advanced, each division requiring one year.

ELEMENTARY.—Instruction in the use of the Jacquard machine to produce figures in all classes of textiles of simple construction.

Construction of machine.—Harness building for simple figures.—Fancy ties for large repeats.—Combination tie for bordered fabrics.—Comberboard calculations.—Planning of designs on point paper.—Calculations for various papers.—Method of painting designs.—Use of colors on design paper.

Calculations for ties and designs.—Card-cutting directions.

Fee for this subject, two hours per week for the term, $15.

ADVANCED.—The advanced work is intended for those who are already familiar with the elementary work, through outside experience or having taken it in the School.

Construction of fabrics of more than one warp and filling.—Tie-ups to control two or more warps.—Use of harness to control part of the fabric.—Scale ties.—Compound harness ties.

Planning of design particulars and specifications.—Brocades.—Damasks.—Brocatelle.—Pile fabrics.

Card-cutting directions.—Card stamping.—Methods of lacing to change patterns.

Correction of errors in fabrics.

Fee for this subject, two hours per week for the term, $15.

SPECIAL FIGURED DESIGN

This course has been arranged for the benefit of those students who desire to specialize in rugs, ingrain, tapestry, brussels, and similar floor coverings, as well as other lines of Jacquard work.

Fee for this subject, two hours per week for the term, $15.

PLAIN HOSIERY KNITTING

This course, covering a period of one year, has been planned with the aim of giving the student not only a general knowledge of the principles and construction of knitted fabrics, but a familiarity with the practical workings of many of the best makes of Knitting Machines, Ribbers and Loopers. A brief outline of the work follows:

Yarn calculations.—Grading yarns with regard to size.—Considering the various systems in their relation to one another.—The relation of count, weight and length of different threads.—The principles and construction of the circular rib top knitting machines, and the knitting of the different classes of tops, with all kinds of the best welts for half hose, wrist and ankle cuffs.—Plaiting of all kinds—silk, cotton etc.; making of legs for children's ribbed stockings; also the principle and construction of seamless hosiery knitting machines; the assembling, setting and adjusting of all parts of the different well-known types employed in making infants', boys' and misses' stockings, men's half hose, ladies' stockings, including the different styles of reinforcing, high splice, double sole, reinforced heel and toe, plaiting of the different colors, etc.

Fee for this subject, two hours per week for the term, $15.

SILK AND RAYON ANALYSIS AND CALCULATIONS

Requiring an attendance of one year.—This course (which will not be given unless there is a sufficient enrollment) has been arranged for the benefit of those students who are employed in the silk industry during the day, and who wish to become more familiar with the construction, analysis and calculation of such fabrics. The studies pursued include such subjects as methods of determining the size and quantity of silk in different samples. Ascertaining the reed and ends per dent. The number of shafts used and heddles per inch per shaft. Correct drafts. The dram and denier systems of grading silks as to size. Lectures on the origin and source of silk. Thrown silk, organzine and tram. The process of throwing explained. Spun silks.

Lectures on the production of silk threads from the waste of throwing and reeling operations. Cost finding systems for ribbons and for broad silks. Fee for this subject, two hours per week for the term, $15.

Chemistry and Dyeing—Course G

One year is required for chemistry and two years for dyeing.

ELEMENTARY CHEMISTRY

Consisting of practical laboratory experiments and lectures.

Introductory ideas on scientific methods of study and experimentation.—Simple manipulations in the use and handling of apparatus.—Chemical action.—Study of hydrogen and oxygen.—Acids, bases and salts.—Chemical notation, symbols, formulas and equations.—Study of typical compounds, with characteristic experiments illustrative of the same.—Chemical laws and calculations.—Solutions of problems.—Preparation and examination of the chief elements and their important compounds by means of laboratory experiments.

Fee for this subject, six hours per week for the term, $45. See "Deposits," page 51.

ELEMENTARY DYEING

Covering the application of the various colors to wool, cotton, silk, and rayon.

Scouring and preparation of loose wool, yarn and cloth.—Bleaching.—Application of the acid colors.—The basic colors.—The mordant colors.—The natural dyes.—Compounding shades.

Scouring and bleaching of cotton.—Methods of applying substantive colors.—Developed colors.—Basic colors.—Alizarine and natural colors.—Methods of mordanting and fixing.—Compounding of shades.

ADVANCED DYEING

Color mixing and matching.—After-treated colors.—Mineral colors.—Natural dyes.—Aniline black.—Naphthol colors.—Silk dyeing.—Union dyeing.—Half-silk dyeing.—Gloria dyeing.—Indigo and other vat dyes.—Sulphur colors.—Developed colors.—Resist dyeing.—Comparative money-value of dyestuffs.

In connection with laboratory work in experimental dyeing, a course of lectures is given once a week, covering the chemical and physical technology of the fibres, scouring and bleaching, methods and theory of dyeing, and special lectures on soaps, mercerizing, etc.; the lecture course covers a period of two years.

Fee for each year of the dyeing course, six hours per week, $45. See "Deposits," page 51.

LECTURE COURSES IN DYEING

Students may take the course of lectures in elementary or advanced dyeing, without the supplementary laboratory work. The course consists of twenty-three lectures of one hour each, and no certificate is given.

The fee for the course of lectures in either elementary or advanced dyeing is $20.

TEXTILE CHEMISTRY

This course in textile chemistry will familiarize the workers in the textile industry with the methods used for the determining of the amounts of the various fibres in mixtures; the detection of impurities in dyes; the analysis of weighted silks, etc. The course does not presuppose a knowledge of analytical chemistry. This course is essential to one who desires to better fit himself for the position of dyer, for the chemist in textile plants, for buyers of textile and processing chemicals as well as those who hold places of trust in department stores. Practical work is given in analysis and testing of important textile materials.

Fee for this subject, one night (two hours) per week for the term, $25. Breakage deposit, $5.00.

TEXTILE FIBRES

This course is intended to make the student familiar with the various fibres that are employed for textile purposes. The origin, chemical and physical properties of fibres are studied. Special attention is given to the use of the microscope in the examination of the structure of all the typical fibres. Numerous commercial samples are analyzed to identify the materials from which they are made. This course is of general interest and necessary to all in any phase of the textile and associated fields.

Fee for this subject, one night (two hours) per week for the term, $25.

Chemistry—Course H

FIRST YEAR—ELEMENTARY CHEMISTRY

Introductory ideas on scientific methods of study and experimentation.—Simple manipulations in the use and handling of apparatus.—Chemical action.—Study of hydrogen and oxygen.—Acids, bases and salts.—Chemical notation, symbols, formulas and equations.—Study of typical compounds, with characteristic experiments illustrative of the same.—Chemical laws and calculations.—Solution of problems.—Preparation and examination of the chief elements and their important compounds by means of laboratory experiments.

This course is elementary, and is carried on by means of lectures and recitations, coupled with considerable laboratory work in experimentation on the properties and preparation of the chemical elements and their compounds.

The tuition fee for this subject is $45 for the term of 6 hours per week. See "Deposits," page 51.

SECOND YEAR—QUALITATIVE ANALYSIS

The analytical classification of the metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions.

This course is arranged with the view of making the student thoroughly familiar with the characteristic reactions whereby the different chemical elements may be recognized and distinguished from one another in their numerous combinations. The work is carried on largely by experiments, and the student is required to solve problems given to him for analysis. He is taught how to test materials with regard to purity and the methods of detecting adulterations in the various commercial products with which he is apt to come in contact.

The tuition fee for this subject is $45 for the term of 6 hours per week. See "Deposits," page 51.

VIEW IN ONE OF THE CHEMICAL LABORATORIES

THIRD YEAR—QUANTITATIVE ANALYSIS

General procedure in analytical methods; sources of error and their prevention.—Preliminary manipulation; use of analytical balances.—Preparation of pure salts.—Methods of precipitation and treatment of precipitates.—Typical gravimetric analyses of the metals.—Analyses of compounds containing several metals.—Gravimetric estimation of the acid radicals.—Principles of electrolytic analysis.

General principles of volumetric procedure.—Classification of volumetric methods.—Use and calibration of graduated apparatus.—Preparation of normal and standard solutions.—Use and limitations of indicators.—Alkalimetry and acidimetry; typical analyses of acids and alkalies.—Volumetric methods by oxidation and reduction.—Volumetric methods of precipitation.—Exercises on commercial products.

In this course the student learns, by means of actual demonstration, the methods of determining quantitatively the composition of various chemical compounds. He is well drilled in the use of the balance, and is taught habits of precision, accuracy of observation and delicacy of manipulation, so necessary for success in chemical analysis. The objects employed for the analyses, as far as possible, are selected from commercial products, and are those best adapted to the immediate needs of the individual student.

The tuition fee for this subject is $45 for the term of 6 hours per week. See "Deposits," page 51.

LAUNDRY OWNERS AND ASSOCIATES—COURSE L

FUNDAMENTALS OF LAUNDRY PRACTICE

A three year course designed to teach the fundamental principles of the laundry process with particular emphasis upon the chemistry of washing and the problems of the laundry, has been developed over a period of years.

This course is offered to the laundry executive, department head, office men, route men and all others interested in the handling of textiles in relation to their laundering.

The first year (three evenings) is devoted to the study of the principles of chemistry which gives the basis upon which all subsequent instruction is given (see page 65).

During the second year (three evenings) a study is made of the textile raw materials, action of chemicals upon them, fastness of dyes, etc. In the third year (two evenings) an intimate study of washroom materials, the factors influencing washing and the problems of the laundry are studied.

Fee for this course first and second year of three evenings each week, $45. For the third year of two evenings each week, $30. A breakage deposit of $15.00 must be made each year.

FOR DRY CLEANERS, DYERS, SPOTTERS, ETC.

Many men from this important industry have taken Course G. This is recommended to cleaners, dyers, spotters, etc., because it deals with the fundamental background of chemistry, dyeing and fibres needed in this work. Also see courses in Textile Fibres and Textile Chemistry.

Donations

To the Institution During the Year

American Card Clothing Company, Philadelphia, Pa.—Card clothing for one Cylinder; 1 Reel Box.

Joseph Bancroft & Sons Company, Wilmington, Del.—Finishing 190 yards of various Cotton Materials.

James H. Billington Company, Philadelphia, Pa.—12 Hickory Picker Sticks.

Boger & Crawford, Philadelphia, Pa.—8 Half Cotton Laps.

Calco Chemical Company, Bound Brook, N. J.—34 lb. Intermediates; 15 lb. Vat Dyes.

E. C. Drew, Boonton Lake, N. J.—1 bbl. Napthole T.

W. B. Dunn Company, Providence, R. I.—100 lb. Cops of Silk of Various Colors.

Fitchburg Yarn Company, Fitchburg, Mass.—10 lb. Sase Skeins.

General Chemical Company, New York, N. Y.—9 Carboys Acids; 1 bbl. Glauber Salt; 20 lb. "Nitrate of Iron."

Hellwig Silk Dyeing Company, Philadelphia, Pa.—Dyeing 35 lb. Tram Silk in Selected Colors.

Laurel Soap Manufacturing Company, Philadelphia, Pa.—25 lb. Palm Oil Flake Soap; 105 lb. Soaps and Oils, various; 373 lb. Caustic Soda.

Proctor & Schwartz, Inc., Philadelphia, Pa.—7 Yards of 3-inch Worsted Webbing for Feeder.

Rice Dobby Chain Company, Millbury, Mass.—25,000 Hard Wood Chain Pegs.

Rodney Hunt Machine Company, Orange, Mass.—One Tru-Shade Metal Dyeing Machine, complete.

Rohm & Haas Company, Philadelphia, Pa.—20 Lykopon.

John Royle & Sons, Paterson, N. J.—2 French Scale Hand Punches.

Schuylkill Chemical Company, Philadelphia, Pa.—1 Carboy Peroxide.

Sonoco Products Company, Hartsville, S. C.—A supply of Cones, Tubes, Underclearer Rolls and Roving Cans.

Steel Heddle Manufacturing Company, Philadelphia, Pa.—750 Super Doupe Heddles, with Harness Frames.

John R. Stewart Company, Philadelphia, Pa.—2 Tops Cut Staple Rayon; 2 Tops Waste Rayon.

Tompkins Brothers Company, Syracuse, N. Y.—One Tompkins Spring Needle Machine and accessories.

Universal Winding Company, Boston, Mass.—Accessories for Winding Machine.

Vanstraaten & Havey, Philadelphia, Pa.—Throwing & Doubling 35 lb. Japan Tram.

The Viscose Company, Marcus Hook, Pa.—12 lb. "Crown" Bright Rayon Yarn; 10 lb. 100 Denier 1st Quality 60 Filament "Chalkelle" Crown Brand Rayon Skeins.

Walker Manufacturing Company, Philadelphia, Pa.—2 Reeds, Special.

Watson-Williams Manufacturing Company, Leicester, Mass.—20,000 Twin Wire Heddles.

William Whitman Company, New York, N. Y.—10 lb. 70/2 AA Spun Rayon, Warp.

Yale Woolen Mills, Yale, Mich.—75 lb. various Colors Silk on Bobbins.

Courtesies Extended

Fletcher Works, Philadelphia.—Erben-Harding Co., Philadelphia.—Aberfoyle Mfg. Co., Chester.—Firth & Foster Co., Philadelphia.—"Fibre and Fabric," Boston, Mass.—"Textile World," New York, N. Y.—"American Silk & Rayon Journal," New York, N. Y.—"Daily News Record," New York, N. Y.—"Men's Wear," New York, N. Y.—"Cotton," Atlanta, Ga.—Saco-Lowell Shops, Lowell, Mass.—Thomas Halton's Sons, Philadelphia.—Proctor & Schwartz, Inc., Philadelphia.—John Royle & Sons, Paterson, N. J.—Crompton & Knowles Loom Works, Worcester, Mass.—Sauquoit Silk Mfg. Co., Philadelphia.—American Card Clothing Co., Philadelphia.—Chas. Bond Co., Philadelphia.—American Moistening Co., Boston, Mass.—R. H. Hood Co., Philadelphia.—H. W. Butterworth & Sons Co., Philadelphia.—Eagle Shirt Factory, Philadelphia.—E. L. Mansure Co., Chicago and Philadelphia.—Standard Machine Co., Philadelphia.—Stead & Miller Co., Philadelphia.—The Moss Rose Mfg. Co., Philadelphia.—The Linen Thread Company, Philadelphia.—J. E. Barbour Company, Paterson, N. J.—Hellwig & Co., Philadelphia.—"Color Trade Journal," New York City.—Walker Manufacturing Company, Philadelphia.—Main Belting Company, Philadelphia.—New York & New Jersey Lubricant Company, New York.—Davison Publishing Company, New York.—Jas. H. Billington & Co., Philadelphia.—Collins & Aikman Corporation, Bristol, R. I.—Rohm & Haas Co., Inc., Philadelphia.—Schuylkill Chemical Co., Philadelphia.—Stowe & Woodward Co., Newton Upper Falls, Mass.—Textile Machine Works, Reading, Pa.—Philadelphia Chamber of Commerce.—Philadelphia Real Estate Board.—Philadelphia Wool Scouring & Carbonizing Co., Philadelphia.—Orr Felt & Blanket Co., Piqua, Ohio.

Influence of the School

A Summarized Estimate of the Work of the School

Some idea of the influence of the School in this mighty industry may be gleaned from the following:

Establishments in which students have become owners or partners: Capitalization, $55,762,000; Broad Looms, 4,837; Narrow Looms, 18,681; Narrow Fabric Looms, 1,331.

Establishments in which students have become managers or superintendents: Capitalization, $69,814,000; Looms operated, 41,150, to which must be added the necessary spinning, dyeing and finishing labor and machinery.

Establishments in which students have become designers: Capitalization, $20,815,000; Looms operated, 6,238.

A considerable number of students have engaged in the marketing of goods, having become commission men, manufacturers' agents, salesmen and stylers of fabrics. A like number have become managers, chemists and foremen dyers in establishments representing a capitalization of $10,000,000.

DRYERS . . .

for all kinds of textile raw stock . . . skein and package yarns . . . warps . . . piece goods . . . hosiery, etc.

GARNETTS .

for reworking woolen, cotton, rayon, silk, jute and other waste . . . for batts, wool and hair felts.

CARDS . .

for wool, worsted, shoddy, asbestos, and all kinds of waste . . . FEEDS, CONDENSERS and other accessories.

4 *Garnett Sales & Service Branches* PHILADELPHIA, CHICAGO, BOSTON, COHOES.

Proctor & Schwartz • Inc.

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Eighty-Nine Years of

DEPENDABILITY

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FOR eighty-nine years, the James Hunter Machine Company has designed and constructed textile machinery —standardized yet flexible enough to meet the most exacting *individual* needs of the individual mill.

So, through the years, Hunter machinery has come to be synonymous with Dependability—equipment that through its long-life returns the maximum profit for the invested dollar.

Complete literature on any or all Hunter machines listed will be mailed postpaid on request, together with complete details of the unique Hunter Engineering Service.

Look for this name-plate on Preparation, Wet Finishing, Drying, Shoddy, and Mattress Machinery. It is your assurance of DEPENDABLE *operation.*

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Engineers, Designers and Manufacturers
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CENTRIFUGAL EXTRACTORS

for dye houses, silk throwsters, laundries, chemical plants.

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for ribbons, tapes, labels, belting, brake lining, elastic webbings, etc.

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for silk and rayon throwsters and weavers.

OILWELL SPINDLES

for any type of twister.

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for dry cleaners, tailors, laundries and clothing manufacturers.

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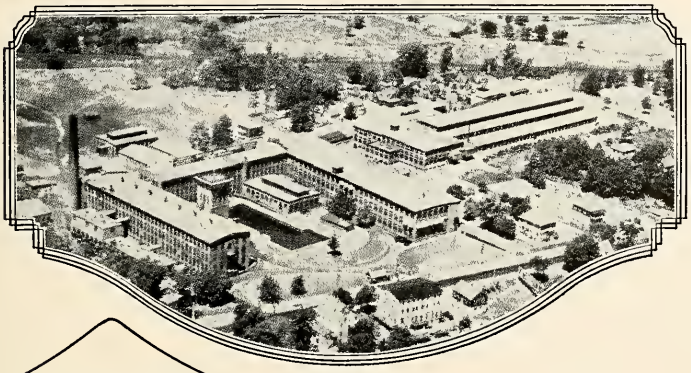
The Largest Factory in the World Devoted Exclusively to the Manufacture of Winding Machines



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(FOR ONE BATH LOGWOOD BLACK ON WOOL)

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OVER ONE HUNDRED YEARS EXPERIENCE HAS SHOWN US THAT NO DYE, NATURAL OR SYNTHETIC, IS SO UNIVERSALLY USED FOR PRODUCING A BLACK COLOR AS LOGWOOD

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Winding on Tubes, Cones, Cops

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WOOLEN AND WORSTED FABRICS

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Emerald and York Sts.

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FINE FABRICS FOR

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Manufacturers of Worsted and Woolen Fabrics for Men's and Women's Garments.

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Uniform quality is the backbone of the Standard-Coosa-Thatcher Line and is maintained by our rigid inspections and tests from the selection of the cotton, all the way through the spinning, mercerizing, bleaching, dyeing and winding.

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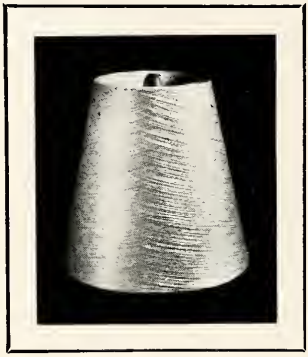

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4-2 to 1 40-2
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Finest Mercerized
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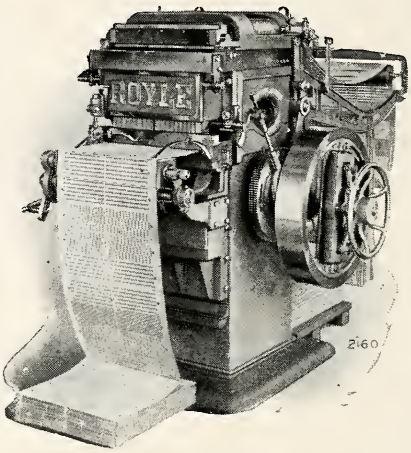
Students of the Philadelphia Textile School are trained in the use of Royle Jacquard Card Machinery.



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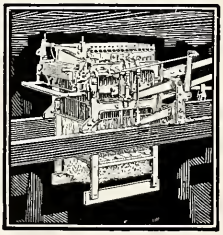

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For knitter, throwster, mercerizer, bleacher, dyer and finisher in the Textile Industry. A complete service including Laboratory cooperation.

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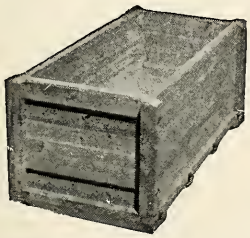

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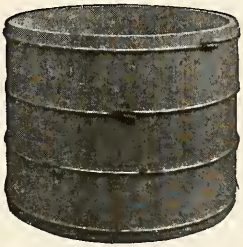

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Send us $1.00 in cash, bank draft, or stamps and we will send you all charges prepaid:

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Use the articles one week, then if you are not thoroughly satisfied, you may return them and we will promptly and cheerfully refund your money without any unpleasant correspondence.

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San-KNIT Fabrics are free from starch, sizing, etc., and are ready to use without first washing.

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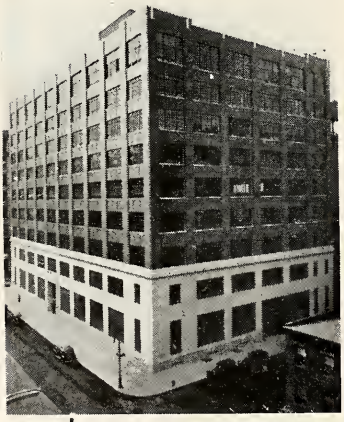

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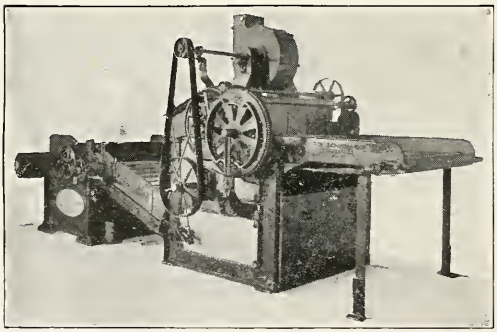

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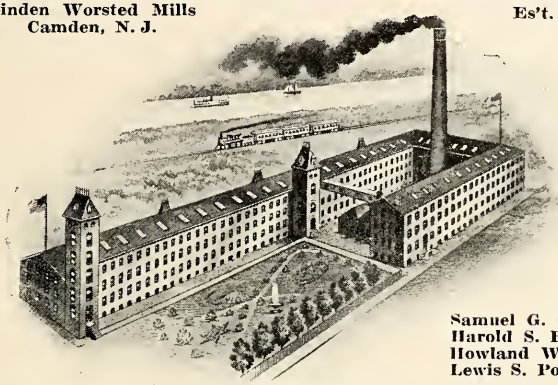

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